ELEMENTARY MATH CURRICULUM

NUMERATION

- NUMBERS BASICS -1-10 TO 100
- COUNTING BY 5S, 10 TO 100
- NUMBERS TO 100, 1000, 1 MILLION

PLACING VALUE

- PLACING VALUE TO 100
- BY TENS, HUNDREDS AND THOUSANDS

ARABIC NUMBERS (1 TO 20, AND BY 10S T0 100)

ADDITION AND SUBTRACTION WITH MANIPULATIVES

- ADDITION WITH MANIPULATIVES
- ADDITIONS WITH NUMBER LINES – SOME REGROUPING
- ADDITION AND SUBTRACTION BY 10S – WITH MANIPULATIVES – TABLE BY 100 CHART
- SUBTRACTION WITH MANIPULATIVES
- SUBTRACTION CHART
- SUBTRACTION WITH NUMBER LINES – UP TO 20

MULTIPLICATION (UP TO 12, ROWS 2 BY2; BY 10, 100)

- WHAT IS MULTIPLICATION
- MUTIPLICATION WITH MANIPULATIVES
- MULTIPLICATION CHART USE MANIPULATIVES
- MUTIPLICATION ONES BY ONES
- MUTIPLICATION – 2 BY 2 ROWS

DIVISION

- WHAT IS DIVISION
- DIVISION WITH MANIPULATIVES
- MULTIPLICATION CHART USE MANIPULATIVES
- DIVISIONS SOLVE

PERIMETER AND AREA – SQUARE UNITS

- PERIMETER AND AREA – 2 D SHAPES

3D SHAPES –

- TYPES OF 3D SHAPES – VOLUME OF 3D SHAPES
- SURFACE AREA – 3D SHAPES
- WHAT IS VOLUME
- CALCULATE VOLUME

INTEGERS

- WHAT ARE INTEGERS
- OPERATIONS WITH INTEGERS
- ADDING AND SUBTRACTING INTEGERS
- MULTIPLYING INTEGERS

FRACTIONS

WHAT ARE FRACTIONS, ADDING FRACTIONS, MULTIPLYING FRACTIONS;

DECIMALS

- *WHAT ARE DECIMALS*
- *ADDING, SUBTRACTING, MULTIPLYING DECIMALS*

FRACTIONS, DECIMALS, PERCENTAGES

- *CONVERT FRACTIONS INTO DECIMALS AND PERCENT (EVERY FRACTION IS A DIVISION)*
- *TABLES 1 AND 2 – EXAMPLES AND PRACTICE*
- *CONVERSIONS TABLES 3&4 – PRACTICE*

EXPONENTS

- *WHAT ARE EXPONENTS (EX 5^3)*
- *OPERATIONS WITH EXPONENTS - RULES (+,-, *, ÷)*
- *WHAT ARE SQUARE ROOTS (NUMBER MULTIPLIED BY ITSELF OR TO THE POWER OF 2- EX 5^2=5*5=25)*
- *SQUARE ROOTS TO 100 TABLE*
- *HOW TO EXTRACT A SQUARE ROOT*

ORDER OF OPERATIONS

- *EXPRESS AS PEDMAS – PARENTHESIS, EXPONENTS, DIVISION, MULTIPLICATION, ADDITION, SUBTRACTION*
- *ORDER OF OPERATIONS EXPLAINED*
- *ORDER OF OPERATIONS – SOLVE OPERATIONS/ CALCULATE*

GEOMETRY

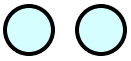
- LINES(SEGMENT, INTERSECTING, PARALLEL)
- NAMING ANGLES – TYPES OF ANGLES
- SUM OF ANGLES IN A TRIANGLE IS 180 DEGREES
- PLOTTING COORDINATES IN A CHART
- QUADRILATERALS (4 SIDES SHAPES)
- 3D SHAPES
- TRANSLATIONS, REFLECTIONS, ROTATIONS
- PYTHAGOREAN THEOREM
- THEORY OF PYTAGORAS $(C^2 = a^2 + b^2)$

- INDEX
- WHAT IS MULTIPLICATION
- WHAT IS DIVISION
- DIVISIBILITY RULES
- PERIMETER AND AREA – 2 D FIGURES
- WHAT IS PERCENT
- 3D SHAPES – AND VOLUME

NUMERATION

- NUMBERS BASICS -1-10 TO 100
- COUNTING BY 5S, 10 TO 100
- NUMBERS TO 100, 1000, 1 MILLION

NUMBER BASICS ~ #1-10 – COLOUR SHEET

ONE	1	
TWO	2	
THREE	3	
FOUR	4	
FIVE	5	
SIX	6	
SEVEN	7	
EIGHT	8	
NINE	9	
TEN	10	

NUMBER BASICS ~ #1-10 – MIX AND MATCH

MIX AND MATCH EACH NUMEBER WITH EACH CORRESPONDING CIRCLE SET;
THEN COULOUR THE CIRCLES EACH WITH A DIFFERENT COLOUR.

1

2

3

4

5

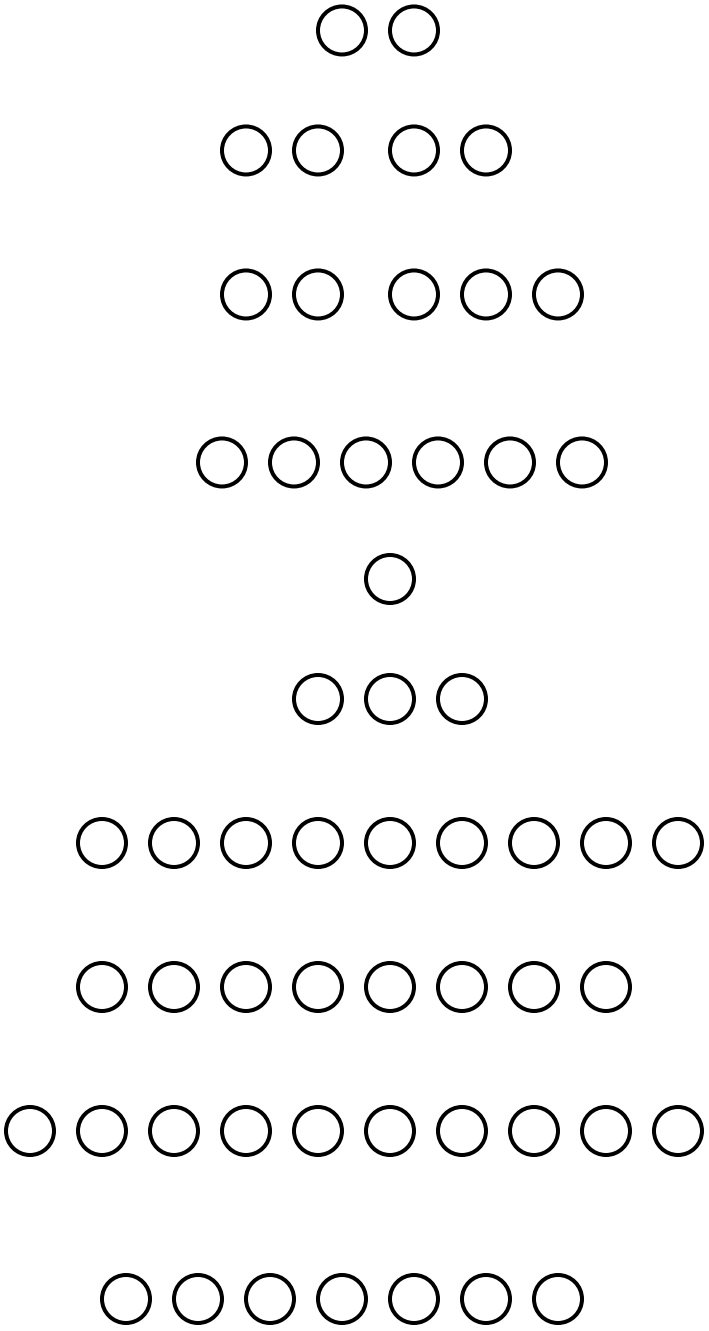
6

7

8

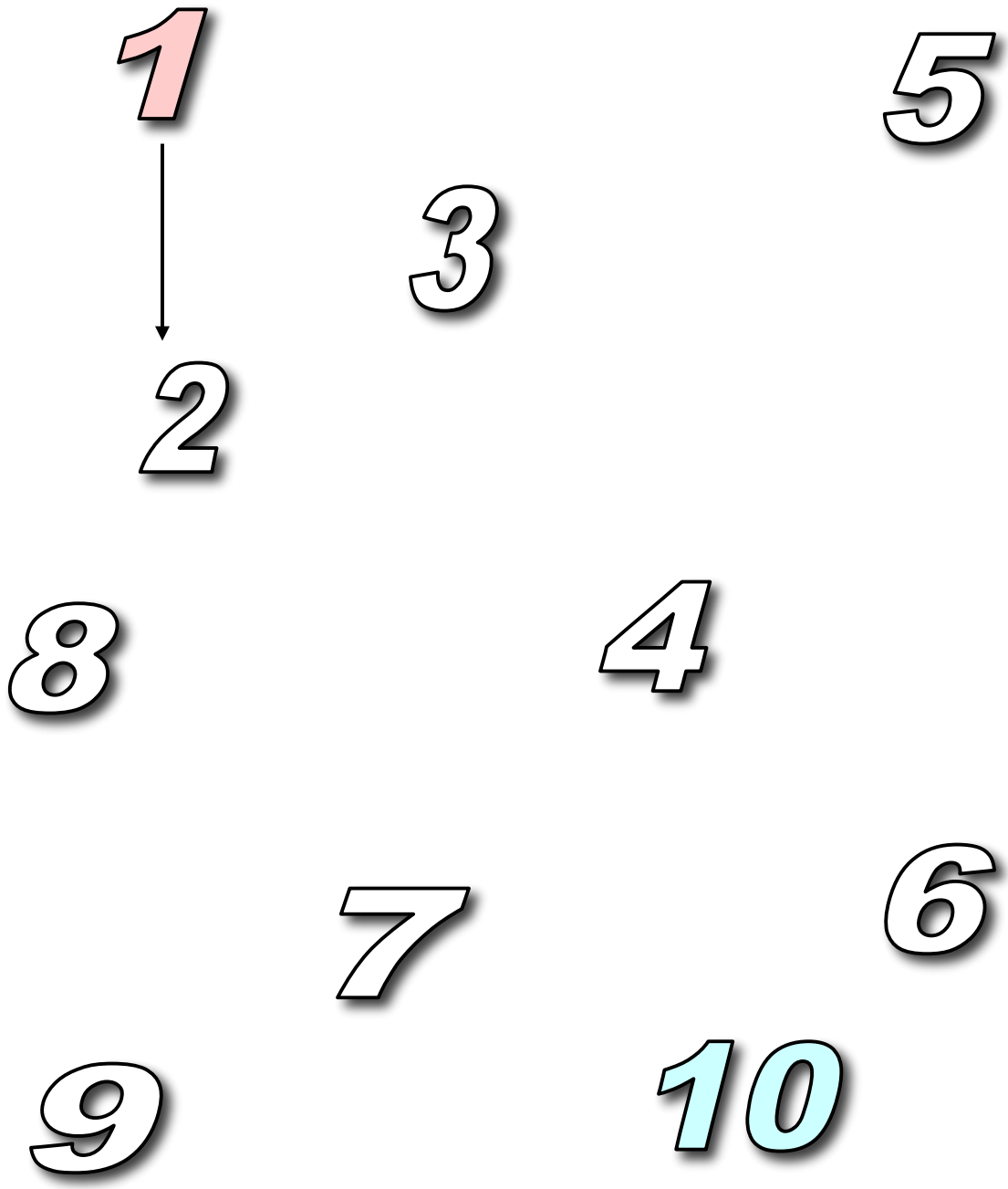
9

10



NUMBER BASICS ~ #1-10 ~ NUMBER MAP

- ***JOIN THE NUMBERS FROM 1 TO 10 USING ARROWS. FIRST NUMBER IS DONE FOR YOU.***



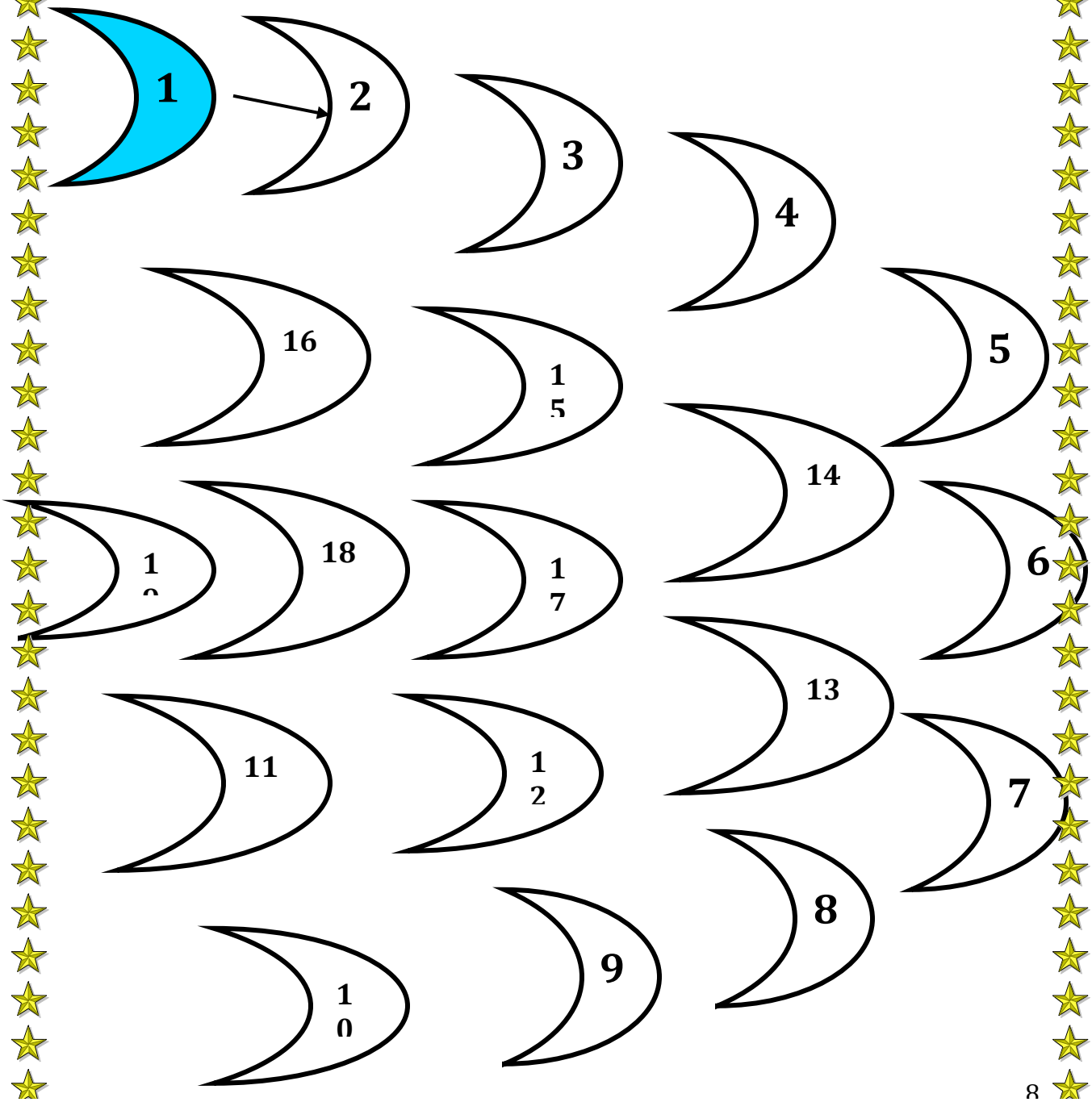
NUMBER BASICS ~ #1-20

THE MOON UMBRELLA

- HERE ARE LISTED THE NUMBERS 1-20:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Connect the stars with arrow lines to link the numbers, starting with #1 and finishing with #20.



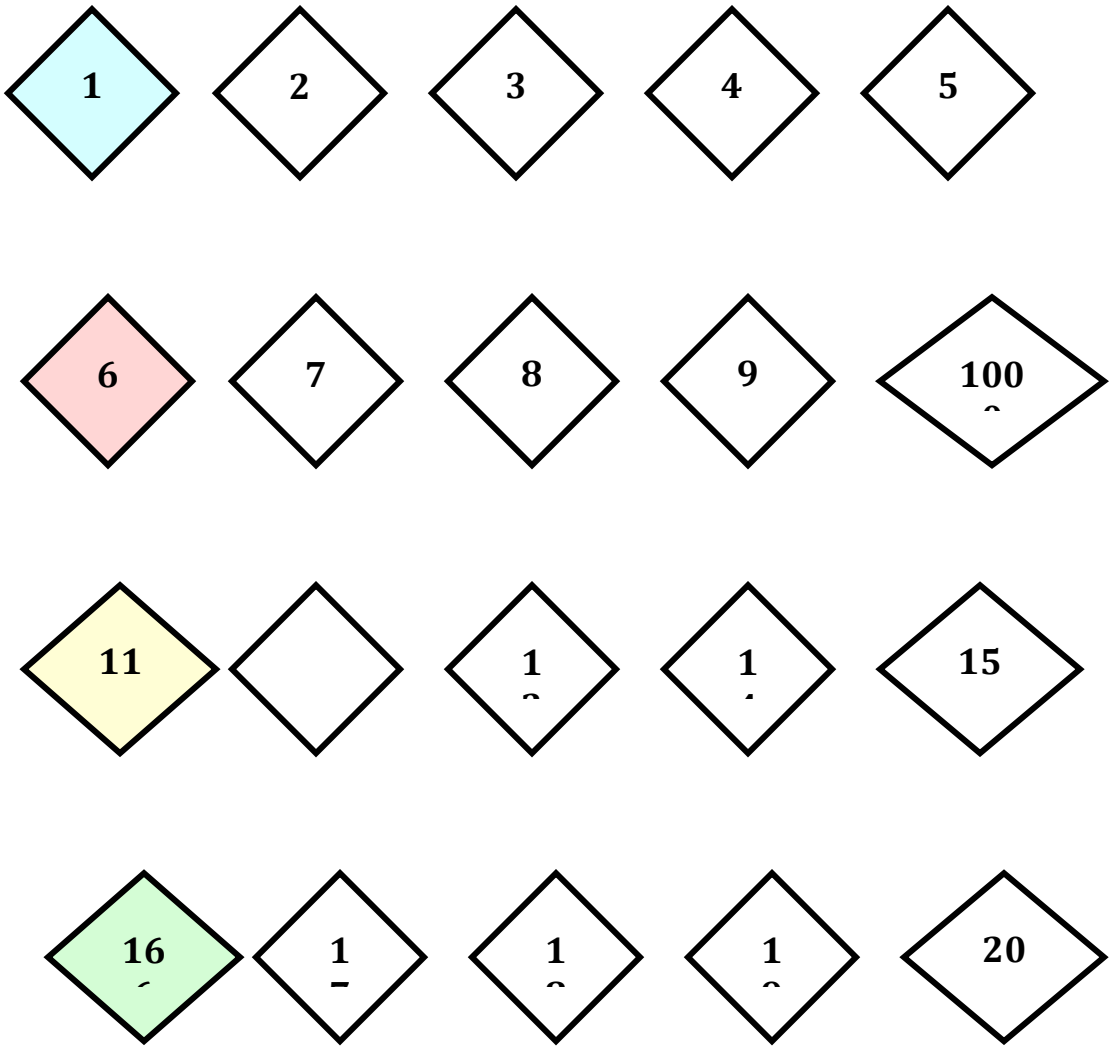
NUMBER BASICS (2ND) ~ #1-20

- Draw dots corresponding to the numbers given; the first example is done for you; Use different colours for each number given.

#	DOTS	#	DOTS
1	●	11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

NUMBER BASICS (3RD) ~ #1-20

- Colour the numbers (grouped in fives)with the given colour; then connect the given boxes with arrows.



NUMBER PATTERNS – *1-100*

Count by ones. Count by twos. Count by fives. Count by tens.
Then fill in the next sheet with counting rows.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

NUMBER PATTERNS – *FILL IN SHEET*

COUNTING PATTERNS:
Counting by twos: 0, 2, 4, 6, 8, 10// 1,3,7,9,11
Counting by fives: 0,5,10,15,20…
Counting by tens: 0,10,20,30,40,…

- Count by 2s from 2 to 100 **(starting with 2,4,6, etc.)**

- Count by **2s** from 1 to 100 **(starting with 1,3,7, etc.)**

- Count by **5s** from 0 to 100

- Count by **10s** from 0 to 100

COUNTING TO 10

1 – ONE
2- TWO
3- THREE
4- FOUR
5 - FIVE
6 - SIX
7 - SEVEN
8 – EIGHT
9- NINE
10 – TEN

HOW MANY TEDDYS? DO YOU SEE?
(COUNTING BY 25 TO 20)

HOW MANY PENS DO YOU SEE?

(COUNTING BY 5S TO 100 –PAGE 1 AND 2)



















COUNTING BY 10S TO 100 – LADYBUGS

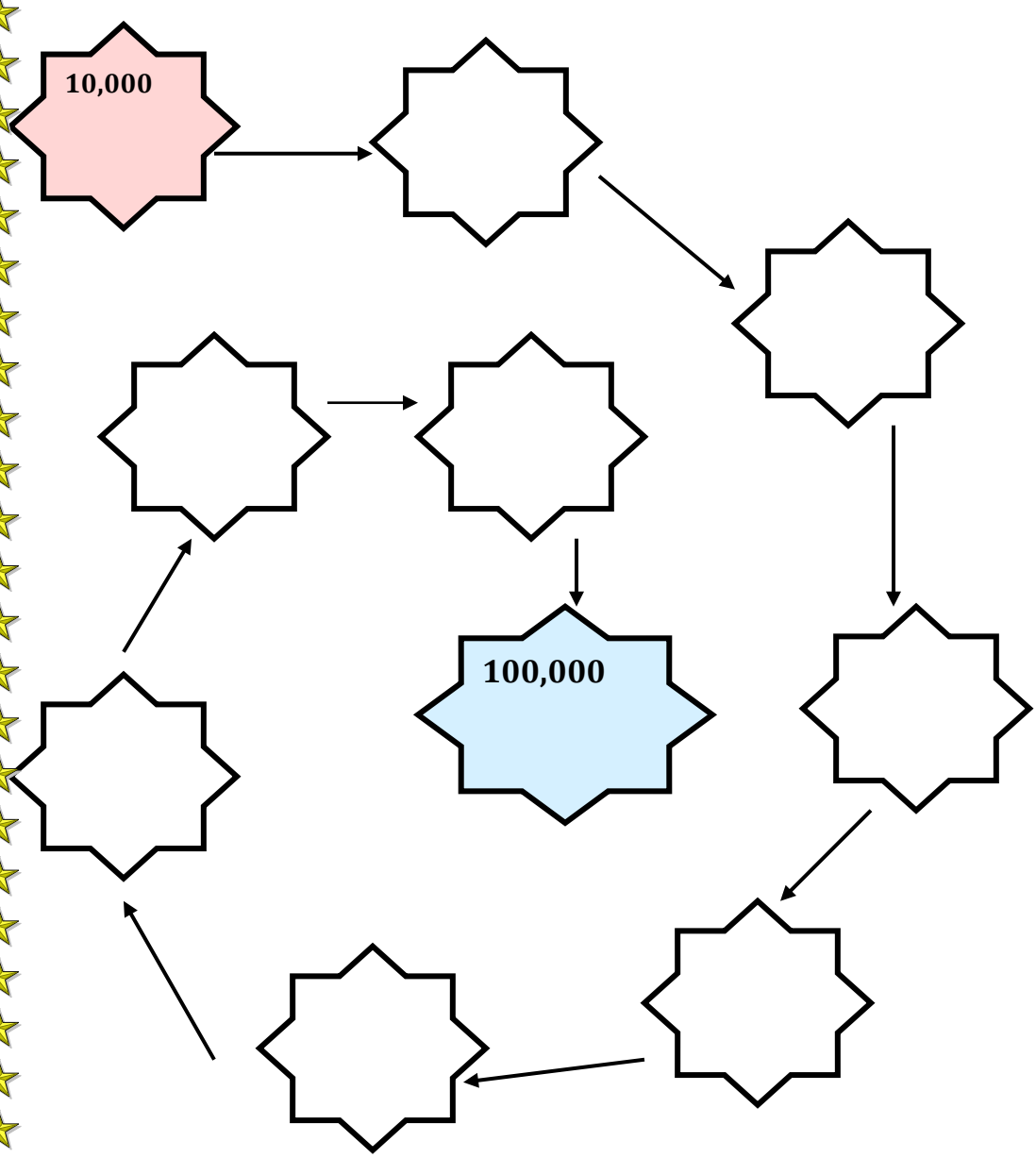
NUMBERS TO 100

COUNT BY *ONES*, BY *FIVES* AND BY *TENS* – WITH YOU KID(S)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

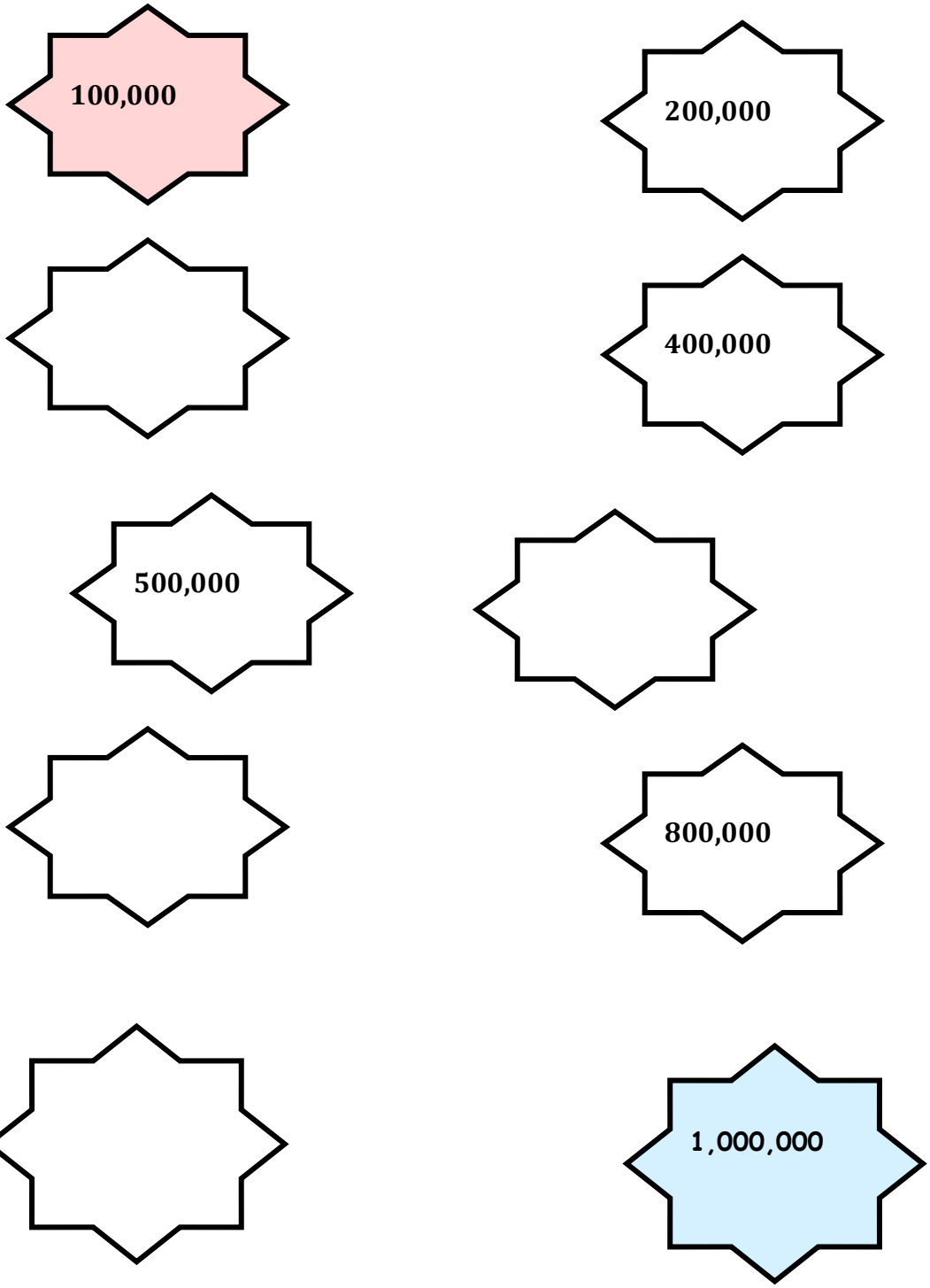
COUNTING BY THOUSANDS – 10,000 TO 100,000

Count by ten thousands up to 100,000. Start with 10,000.



COUNTING BY HUNDREDS OF THOUSANDS

100,000 TO 1,000,000

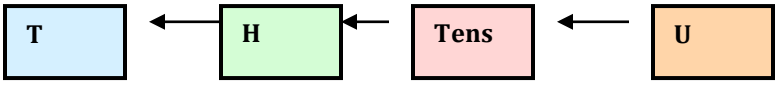


PLACING VALUE

- PLACING VALUE TO 100
- BY TENS, HUNDREDS AND THOUSANDS

NUMBERS' PLACES – WORKSHEET #1

You are given 8 numbers – place the numbers in the given boxes.
Then write the numbers in words.



- **6,712 -** 

- **1,209 -** 

- **7,652 -** 

- **5,220 -** 

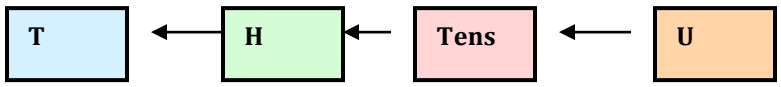
- **3,812 -** 

- **8,915 -** 

- **3,333 -** 

NUMBERS' PLACES – WORKSHEET #2

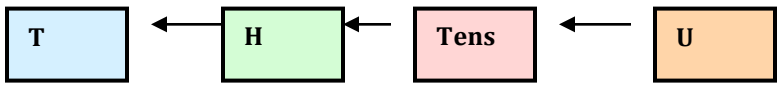
You are given 10 numbers – place the numbers in the corresponding columns. First example is made for you.



NUMBER	Thousands	Hundreds	Tens	Units
1,286	One	Two	Eight	Six
3,455				
5,678				
5,325				
4,875				
3,262				
1,543				
2,845				
6,524				
7,146				

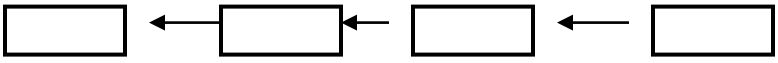
NUMBERS' PLACES – WORKSHEET #3

- You are given 6 numbers (parent/teacher fill in the numbers)– place the numbers in the given boxes. Then write the numbers in words.



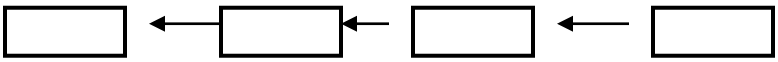
- ____-

- _____ -

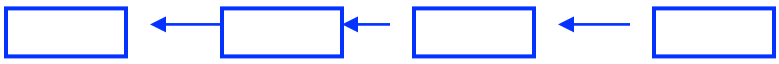


- _____ -

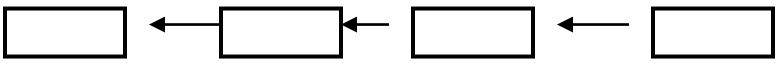
- _____-



- _____ -



- _____ -



ARABIC NUMBERS 1-10 AND TO 100

- ARABIC NUMBERS 1-10 – SYMBOLS AND TRANSLITERATION
- ARABIC NUMBERS 1-10 – FILL IN
- ARABIC NUMBERS BY 10 TO 100

ARABIC NUMBERS - 1 TO 10

٥	٤	٣	٢	١
5	4	3	2	1
١٠	٩	٨	٧	٦
10	9	8	7	6

0 – SIFR – ZERO
1- WAAHID
2- ITHNAAN
3- THALAATHA
4- ARBA'A
5- KHAMSA
6- SITTA
7- SAB'A
8- THAMANEEYA
9- TIS'A
10 - A'ASHARA

ARABIC NUMBERS - 1 TO 10 - ACTIVITY

٥	٤	٣	٢	١
5	4	3	2	1
١٠	٩	٨	٧	٦
10	9	8	7	6

Number	Arabic Number Symbol	Transliteration
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

ARABIC NUMBERS TO 100

١ _٢ _٣_٤ _٥_٦_٧_ ٨ _٩ _١٠

١١ _ ١٢ _ ١٣ _١٤ _١٥ _١٦ _١٧ _ ١٨_١٩_ ٢٠

٢١ _٢٢ _٢٣_ ٢٤_٢٥ _٢٦_٢٧ _٢٨ _٢٩ _٣٠

٣١ _٣٢_ ٣٣_٣٤_ ٣٥_ ٣٦_ ٣٧_ ٣٨ _٣٩_ ٤٠

٤١ _ ٤٢_ ٤٣ _٤٤ _٤٥ _٤٦ _٤٧ _٤٨ _٤٩ _٥٠

٥١ _ ٥٢ _٥٣ _٥٤ _٥٥_٥٦_ ٥٧ _٥٨ _ ٥٩ _٦٠

٦١ _٦٢ _ ٦٣_ ٦٤ _٦٥_٦٦ _٦٧_٦٨_٦٩_٧٠

٧١ _٧٢ _٧٣ _٧٤_٧٥ _٧٦ _٧٧ _٧٨ _٧٩ _٨٠

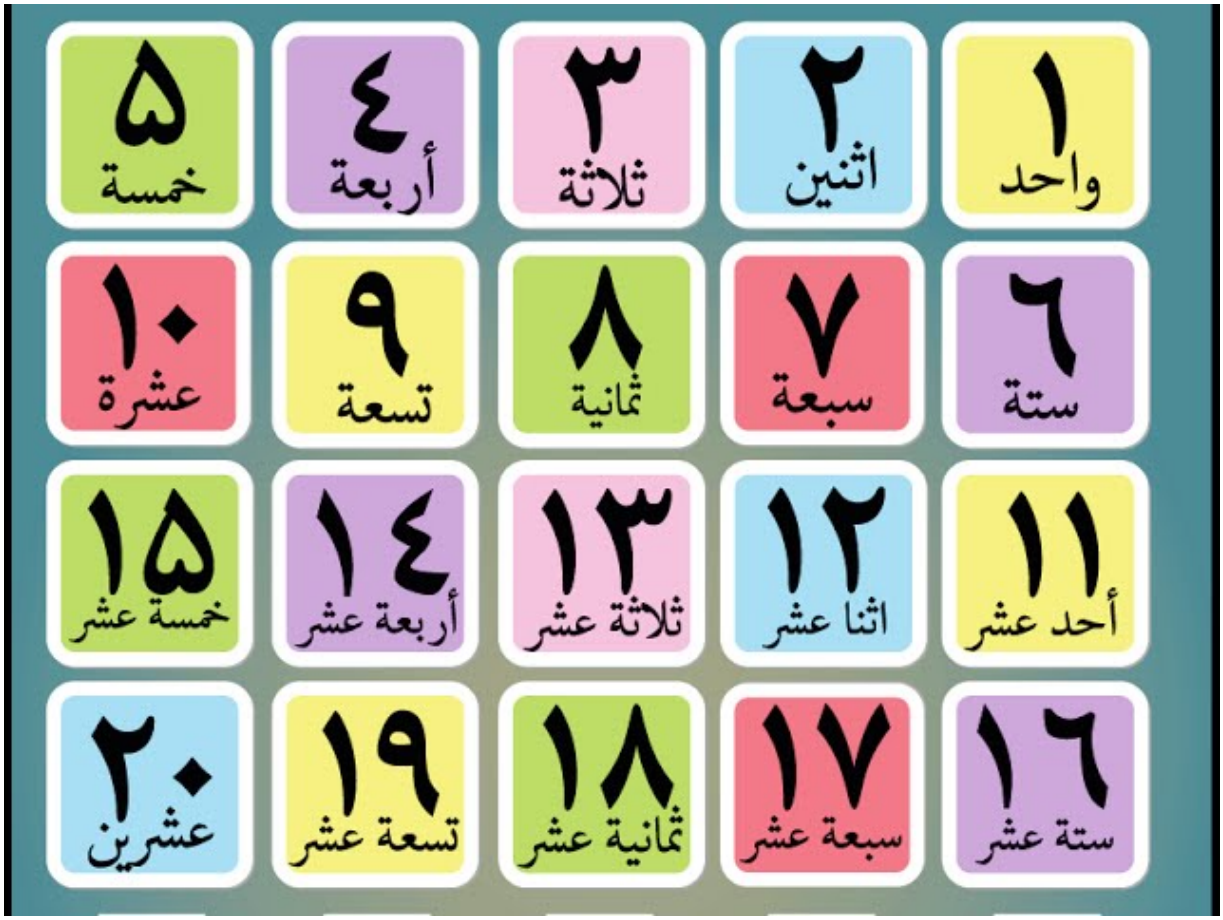
٨١_ ٨٢ _٨٣ _٨٤ _٨٥ _٨٦ _٨٧_٨٨ _٨٩ _٩٠

٩١ _٩٢_٩٣ _٩٤ _٩٥ _٩٦ _٩٧ _٩٨ _٩٩ _١٠٠

NUMERAL		ORDINAL	CARDINAL
0	٠	(ṣifr) صفر	
1	١	(wāḥid) واحد	m - (awwal) اول f - (ūla) اولى
2	٢	(iṯnān) إثنان	(alṯani) الثّاني
3	٣	(ṯālaṯa) ثلاثة	(alṯalṯu) الثّالِثُ
4	٤	(ārba'a) أربعة	(alrab'eu) الرّابِعُ
5	٥	(ẖamsa) خمسة	(alẖamsu) الْخامِسُ
6	٦	(sitta) ستة	(alsadsu) السّادِسُ
7	٧	(sab'a) سبعة	(alsab'eu) السابِعُ
8	٨	(ṯamāniya) ثمانية	(alṯamnu) الثّامِنُ
9	٩	(tis'a) تسعة	(altas'eu) التّاسِعُ
10	١٠	('ashra) عشرة	(al'ashru) الْعاشِرُ
11	١١	عشر إحدى (aḥada 'ashar)	m - (alhady 'ashar) عَشَرَ الحادِيَ f - (alhadiata 'ashar) عَشْرَةَ الحادية
12	١٢	عشر إثنا (iṯnā 'ashar)	m - (alṯani 'ashar) عَشَرَ الثانيَ f - (alṯania 'ashar) عَشْرَةَ الثانية
13	١٣	عشر ثلاثة (ṯālatha 'ashar)	(alṯaleṯ 'ashar) الثالثَ عَشَرَ f - (alṯaleṯata 'ashar) عَشْرَةَ الثالثة
14	١٤	عشر أربعة (arba'a 'ashar)	m - (alrabe 'ashar) عَشَرَ الرابعَ f - (alrabet 'ashar) عَشْرَةَ الرابعة
15	١٥	عشر خمسة (ẖamsa 'ashar)	m - (alẖamis 'ashar) عَشَرَ الخامِسَ f - (alẖamst 'ashar) عَشْرَةَ الخامسة
16	١٦	عشر ستة (sitta 'ashar)	m - (alsadis 'ashar) عَشَرَ السادِسَ f - (alsadst 'ashar) عَشْرَةَ السادسة
17	١٧	عشر سبعة	m - (alsabe

		(sab’a ‘ashar)	‘ashar) عَشَرَ السابعَ f - (alsabet ‘ashar) عَشْرةَ السابعةَ
18	١٨	عشر ثمانية (ṯamāniya ‘ashar)	m - (alṯamn ‘ashar) عَشَرَ الثامنَ f - (alṯamnt ‘ashar) عَشْرةَ الثامنةَ
19	١٩	عشر تسعة (tis’a ‘ashar)	m - (altase ‘ashar) عَشَرَ التاسعَ f - (altaset ‘ashar) عَشْرةَ التاسعةَ
20	٢٠	عشرون (‘ishrun)	(aleishrun) العِشرونَ
21	٢١	عشرون و واحد (wāḥed wa-’ishrun)	
22	٢٢	وعشرون إثنان (iṯnāne wa-’ishrun)	
23	٢٣	عشرون و ثلاثة (ṯālaṯa wa-’ishrun)	
24	٢٤	عشرون و أربعة (arba’a wa-’ishrun)	
25	٢٥	عشرون و خمسة (ḫamsa wa-’ishrun)	
26	٢٦	عشرون و ستة (sitta wa-’ishrun)	
27	٢٧	وعشرون سبعة (sab’a wa-’ishrun)	
28	٢٨	عشرون و ثمانية (ṯamāniya wa-’ishrun)	
29	٢٩	عشرون و تسعة (tis’a wa-’ishrun)	
30	٣٠	(ṯālaṯun) ثلاثون	
40	٤٠	(arba’un) أربعون	
50	٥٠	(ḫamsun) خمسون	
60	٦٠	(sittun) ستون	
70	٧٠		
80	٨٠		
90	٩٠		
100	١٠٠		
1,000	١٠٠٠		
2,000	٢٠٠٠		
100,000	١٠٠٠٠٠		

Arabic Numbers – 1 to 20 – Arabic Script



ARABIC NUMBERS PRACTICE CHART

Numbers 1-20; practice re- writing the Arabic Numbers from 1-20 in the Fill in section – and write the Transliteration below;

Number	Arabic Number	Arabic Number (your fill in)	Write the Transliteration
0	٠		sifr
1	١		
2	٢		
3	٣		
4	٤		
5	٥		
6	٦		
7	٧		
8	٨		
9	٩		
10	١٠		
11	١١		
12	١٢		
13	١٣		
14	١٤		

15	١٥		
16	١٦		
17	١٧		
18	١٨		
19	١٩		
20	٢٠		

Arabic Numbers Practice Chart - Activity

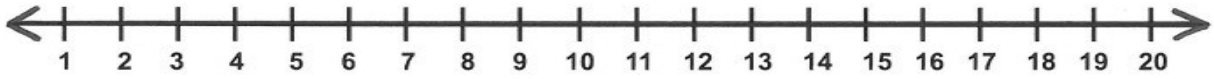
Numbers 10-100 by tens; practice writing the Arabic Numbers from 10-100 in the Fill in section – and write the Transliteration below;

Number	Arabic Number	Arabic Number (your fill in)	Write the Transliteration
10	١٠		Ashra
20			
30			
40			
50			
60			
70			
80			
90			
100			

ADDITION AND SUBTRACTION WITH MANIPULATIVES

- ADDITION WITH MANIPULATIVES
- ADDITIONS WITH NUMBER LINES – SOME REGROUPING
- ADDITION AND SUBTRACTION BY 10S – WITH MANIPULATIVES – TABLE BY 100 CHART
- SUBTRACTION WITH MANIPULATIVES
- SUBTRACTION CHART
- SUBTRACTION WITH NUMBER LINES – UP TO 20

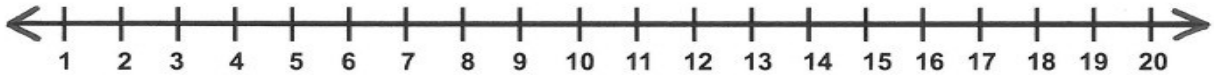
ADDITIONS WITH SOME REGROUPING



Using the number lines you may count to solve the Additions:

5+3 =	*2+7=*
8+3 =	*3+8=*
6+7=	*4+6=*
2+3=	*7+10=*
7+7=	*8+5=*
9+9=	*9+1=*
2+2=	*2+8=*
4+5 =	*5+6=*
8+6=	*9+7=*
9+5=	10+7=

ADDITIONS WITH SOME REGROUPING



Using the number lines you may count to solve the Additions:

4+3 =	*3+7=*
9+3 =	*3+11=*
6+7=	*4+7=*
6+3=	*8+10=*
5+5=	*8+6=*
10+10=	*9+11=*
4+4=	*12+5=*
8+5 =	*5+2=*
9+6=	*8+7=*
3+5=	4+7=

SUBTRACTION - MANIPULATIVES

Solve the subtractions in the Chart:

Initial #	*Remove*	*How many left? Picture*	*How many left? #*
*** * *** 7	Take 4 out	***	3
***** ***** 10	Take 3 out		
**** **** 8	Take 5 out		
*** ** 5	Take 4 out		
***** * 6	Take 2 out		
*** *** *** 9	Take 5 out		
*** 3	Take 2 out		
* 1	Take 1 out		
** 2	Take 1 out		
** ** 4	Take 2 out		

SUBTRACTION with Manipulatives

Solve the subtractions in the Chart:

Initial #	*Remove*	*How many left? Picture*	*How many left? #*
**** **** 8	Take 4 out	***	3
***** ***** 10	Take 6 out		
***** 5	Take 5 out		
***** ****9	Take 3 out		
***** * 6	Take 2 out		
*** *** *** 9	Take 7 out		
*** 3	Take 2 out		
* 1	Take 1 out		
** 2	Take 1 out		
** ** 4	Take 2 out		

SUBTRACTION – Chart 2

Solve the Subtractions – Illustrate with shapes (stars, moons etc)

	How many left? Picture	*How many left? #*
8-5 =	***** ***	3
5-3 =		
2-2 =		
10-5 =		
8-6=		
9-7=		
4-3 =		
5-1 =		
7-7 =		
10-3=		
10-10=		
7-5=		
5-4=		
7-3=		

SUBTRACTION – Table 1

Complete the Subtraction Table -1 and 2s ; in the picture category add manipulatives;

Ones	*Picture 1*	*Twos*	*Picture 2*
1-1 =			
2-1 =		2-2=	
3-1=		3-2=	
4-1=		4-2=	
5-1=		5-2=	
6-1=		6-2=	
7-1 =		7-2=	
8-1 =		8-2=	
9-1=		9-2=	
10-1=		10-2=	
11-1 =		11-2=	
12-1 =		12-2 =	

SUBTRACTION – Table 2

Complete the Subtraction Table -3 to 5s

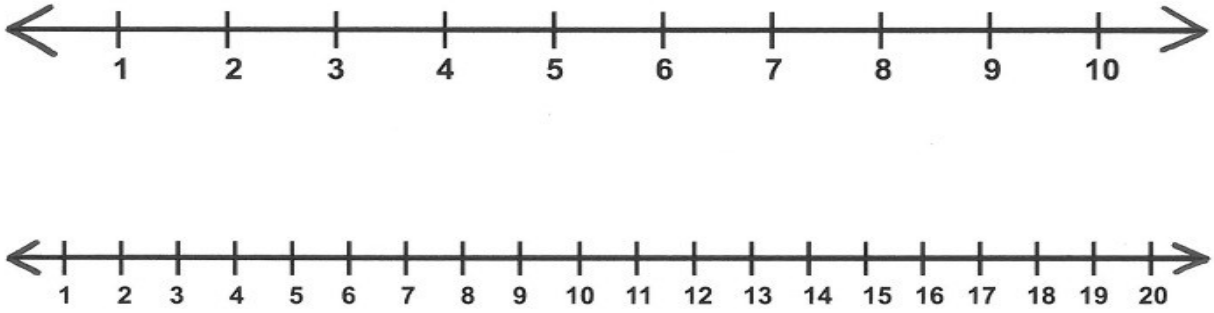
Threes	*Fours*	*Fives*
3-3 =		5-5=
4-3=	4-4=	6-5=
5-3=	5-4=	7-5=
6-3=	6-4=	8-5=
7-3=	7-4=	9-5=
8-3=	8-4=	10-5=
9-3=	9-4=	11-5=
10-3=	10-4=	12-5=
11-3=	11-4=	13-5=
12-3=	12-4=	14-5=
13-3=	13-4 =	15-5=
14-3=	14-4=	16-5=

SUBTRACTION – Table 3

Complete the Subtraction Table -6 to 10s

Sixes	*Sevens*	*Eights*
6-6 =	7-7=	8-8=
7-6=	8-7=	9-8=
8-6=	9-7=	10-8=
9-6=	10-7=	11-8=
10-6=	11-7=	12-8=
11-6=	12-7=	13-8=
12-7=	13-7=	14-8=
13-7	14-7=	15-8=
14-7	15-7=	16-8=
15-7	16-7=	17-8=
Nines	*Tens*	
9-9=	10-10=	
10-9=	11-10=	
11-9=	12-10=	
12-9=	13-10=	
13-9=	14-10=	
14-9=	15-10=	
15-9=	16-10=	
16-9=	17-10=	
19-9=	18-10=	
20-9=	19-10=	
	20-10=	

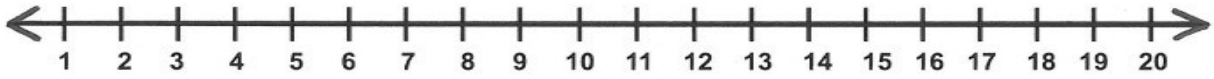
SUBTRACTIONS WITH SOME REGROUPING



Using the number lines you may count to solve the Subtractions:

5-3 =	*7-2=*
8-3 =	*8-3=*
16-7=	*16-4=*
12-3=	*17-7=*
7-7=	*18-5=*
9-5 =	*19-10=*
6-2=	*12-8=*
5-4 =	*15-6=*
8-6=	*19-7=*
19-5=	10-7=

SUBTRACTIONS WITH SOME REGROUPING



Using the number lines you may count to solve the Subtractions:

4 -3 =	*7-3=*
9-3 =	*11-3 =*
17-6=	*17-4=*
16-8=	*18-10=*
15-5=	*18-6=*
10-10=	*19-11=*
14-4=	*12-5=*
18-5 =	*15-2=*
19-6=	*18-7=*
13-5=	14-7=

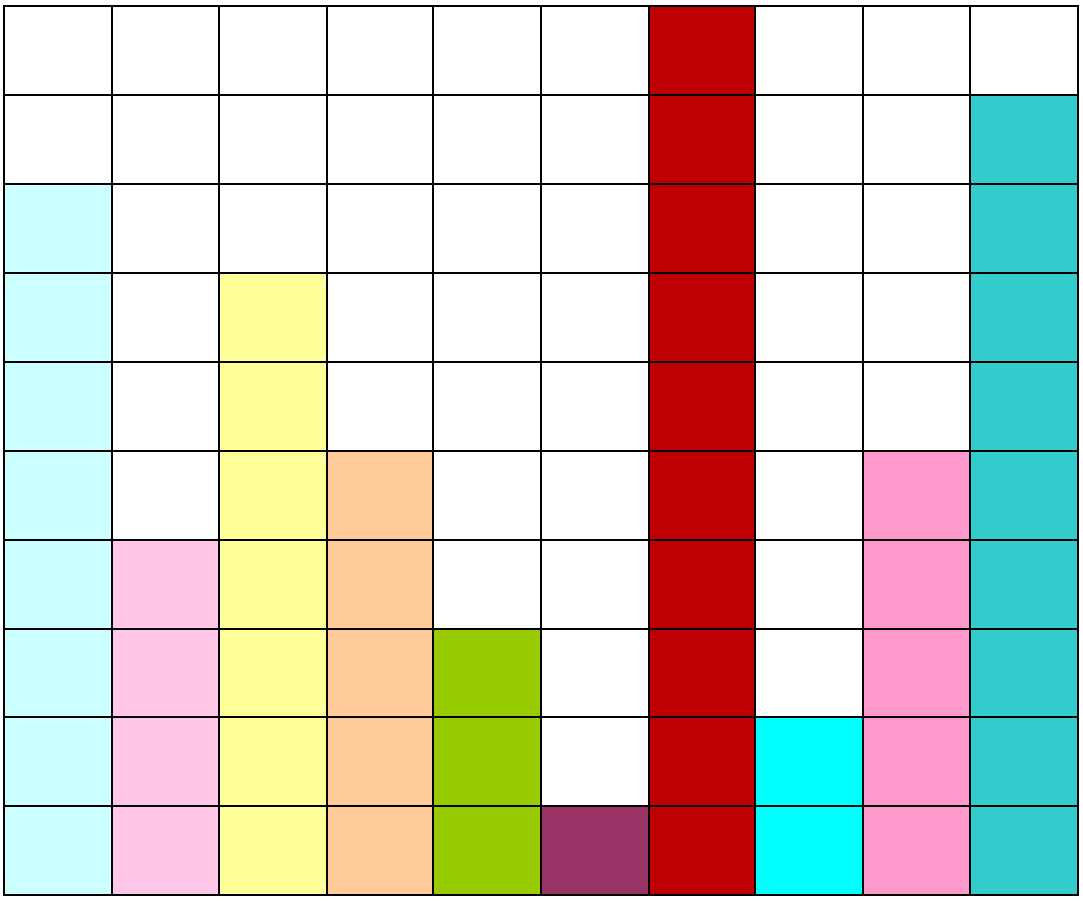
Addition and Subtraction by 10s

10	20	30	40	50	60	70	80	90	100

80 Add 10		60 Take 30 out
100 Take out 20	20 add 50	
80 take out 40		30 add 40
40 take out 10		70 take out 70
	50 add 30	90 add 10

Table to 100 – Subtraction by 10s

Imagine each box is 10 units – so give a number value to each colour; ex. First is 8 units – so it represents number 80 ;



Take off units of each given colours and write down how much is left; take out units of each colour except if the number of units is less (ex. Cant take 30 off 10)- as long as the number is equal or higher;

Take 10 units off of each colour; How much left?
Take 20 units off each color- except dark purple –
Take 30 off units off each colour –
Take 40 units light blue, yellow, maroon, dark pink and teal –
Take 50 units off light blue, yellow, maroon, teal
Take 60 units off maroon and teal
Take 70 units off light blue, yellow, maroon and teal
Take 80, and 90 units off maroon and teal
Take 100 (10 boxes) out of maroon

Table to 100

Answer Set:

Take 10 units off of each colour; How much left?
Answer –

Take 20 units off each color- except dark purple –
Answer –

Take 30 off units off each colour –
Answer –

Take 40 units light blue, yellow, maroon, dark pink and teal –
Answer –

Take 50 units off light blue, yellow, maroon, teal
Answer –

Take 60 units off maroon and teal
Answer

Take 70 units off light blue, yellow, maroon and teal
Answer –

Take 80, and 90 units off maroon and teal
Answer –

Take 100 (10 boxes) out of maroon
Answer -

MULITPLICATION

- WHAT IS MULTIPLICATION
- MUTIPLICATION WITH MANIPULATIVES
- MULTIPLICATION CHART USE MANIPULATIVES
- MUTIPLICATION ONES BY ONES
- MUTIPLICATION – 2 BY 2 ROWS

WHAT IS MULTIPLICATION

Multiplication is Repeated Addition

Examples:

- Number 4~ 3 times is 12 - 4+4+4 =12 or 4*3=12
- Number 1 – 1 times is 1 – or 1*1 is 1
- Number 5 – 6 times is 30 – or 5+5+5+5+5+5=30
- Number 9 ~ 3 times is 27 – or 9+9+9 =27 or 9 times 3 is 27
- Number 10 ~7 times is 70 – 10+10+10+10+10+10+10=70

4*3=12

*	*	*	*
*	*	*	*
*	*	*	*

1*1 =1

*

5*6=30

*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

9*3=27

*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*

MUTIPLICATION CHART

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

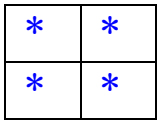
MULTIPLICATION WITH MANIPULATIVES

Solve the given Multiplication by Filling in the given Charts ; first one is done for you

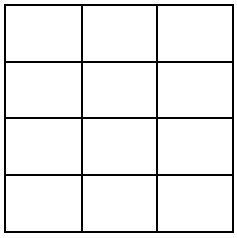
Row 1	Row 2	Row 3
2*2=	5*3=	6*2=
3*4=	4*1=	7*7=
4*6=	8*10=	8*4=
5*4 =	9*9=	1*10=
6* 3=	7*3=	10*3=

Row 1

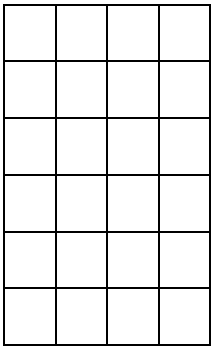
2*2 = 4



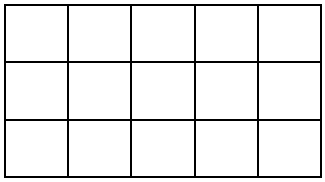
3*4=



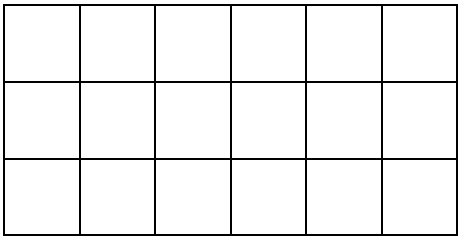
4*6 =



6*3=

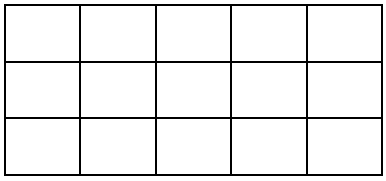


5*4=



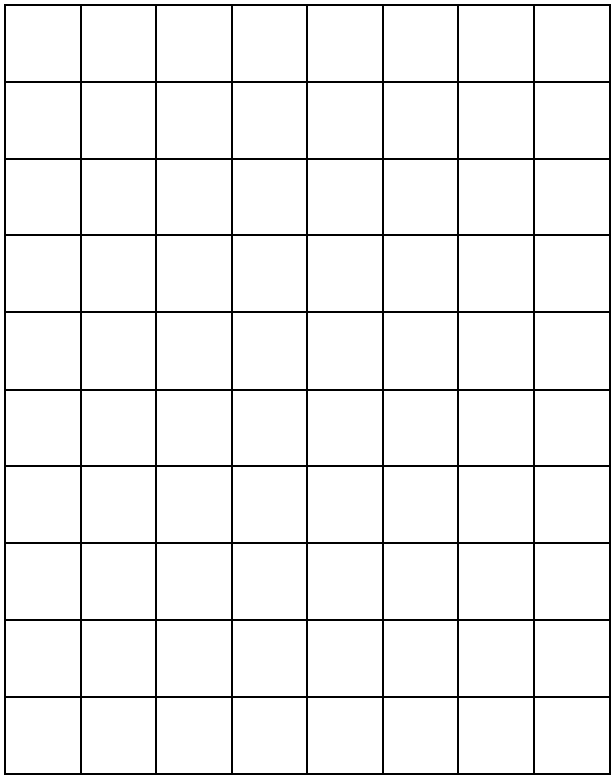
Row 2

5*3=

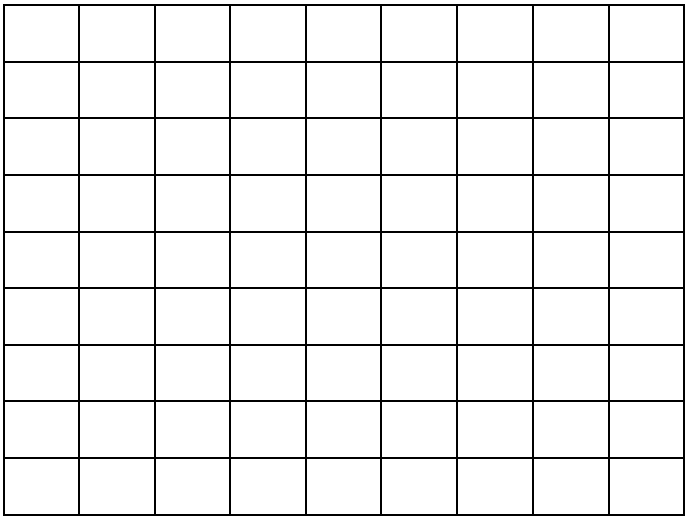


4*1=1

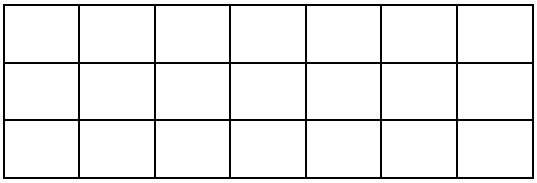
8*10= 80



9*9=81



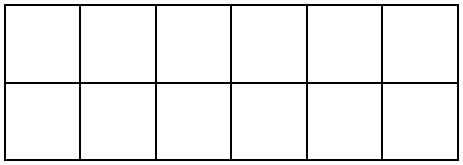
7*3=21



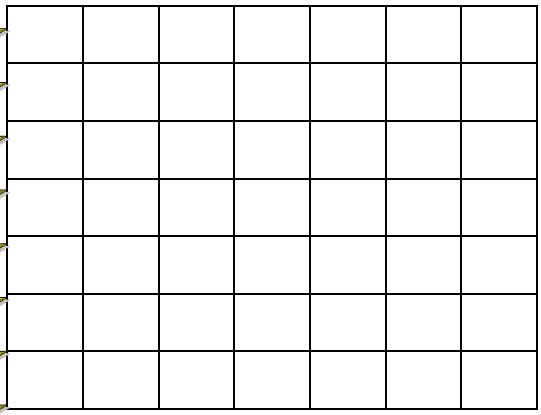
Row 3

10*1 =

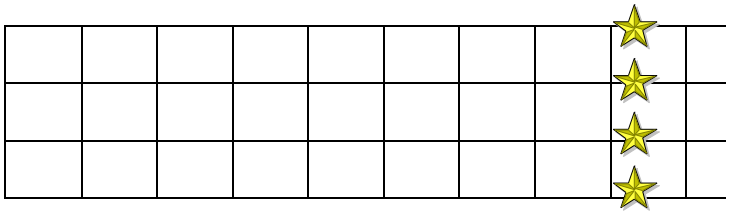
6*2 =



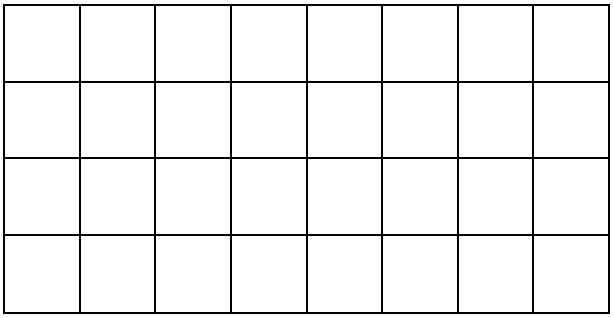
7*7=



10*3=



8*4 =



MULTIPLICATION CHART:

For each Multiplication –illustrate it with stars or shapes of your choice;

NAME:_____
_____

Multiplication 1&2			
1*1=	*	2*1=	**
1*2=		2*2=	** **
1*3=		2*3=	
1*4=		2*4=	
1*5=		2*5=	
1*6 =		2*6=	
1*7=		2*7=	
1*8=		2*8=	
1*9=		2*9=	
1*10 =		2*10=	

MULTIPLICATION 3&4			
3*1=		4*1=	
3*2=		4*2=	
3*3=		4*3=	
3*4=		4*4=	
3*5=		4*5=	
3*6=		4*6=	

3*7=		4*7=	
3*8=		4*8 =	
3*9=		4*9=	
3*10 =		4*10=	

MULTIPLICATION 5& 6			
5*1=	* * * * *	6*1=	
5*2=		6*2=	
5*3=		6*3=	
5*4=		6*4=	
5*5=		6*5=	
5*6 =		6*6=	

5*7=		6*7=	
5*8=		6*8=	
5*9=		6*9=	
5*10 =		6*10=	

MULTIPLICATION

7& 8

7*1=		8*1=	********
7*2=	******* *******	8*2=	
7*3=		8*3=	
7*4=		8*4=	
7*5=		8*5=	
7*6=		8*6=	

7*7=		8*7=	
7*8=		8*8 =	
7*9=		8*9=	
7*10 =		8*10=	

MULTIPLICATION 9 &10s			
9*1=	* * * * * * * * *	10*1=	**********
9*2=		10*2=	
9*3=		10*3=	
9*4=		10*4=	
9*5=		10*5=	

9*6 =		10*6=	
9*7=		10*7=	
9*8=		10*8=	
9*9=		10*9=	

MULTIPLICATION ONES BY ONES

Solve the Multiplications:

5*5=	5*3 =	5*8=
7*7=	7*6=	7*4=
3*3=	3*8=	3*1=
4*4=	4*2=	4*6=
9*9=	9*1=	9*3=
8*8=	8*4=	8*7=
10*10=	10*3=	10*6=
1*1=	1*5=	1*7=
2*2=	2*7=	2*9=
6*6=	6*5=	6*8=

MULTIPLICATION TWOS BY TWOS

Solve the Multiplications – Show all your work on separate pages – in case you need help, video on bottom of the page explains you how to do it

51*53=	51*31 =	53*84=
73*76=	72*63=	71*43=
30*3=	38*85=	33*11=
43*46=	45*25=	42*66=
91*97=	90*15=	93*35=
81*83=	86*43=	85*71=
10*10=	10*36=	10*61=
11*11=	14*54=	14*73=
24*26=	24*75=	24*93=
63*63=	66*58=	63*86=

- https://www.khanacademy.org/math/arithmetic-home/multiply-divide/multi-digit-mult/v/multiplying-2-digit-numbers

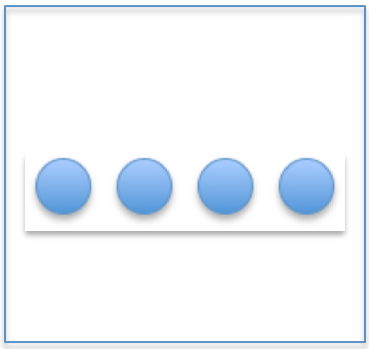
DIVISION

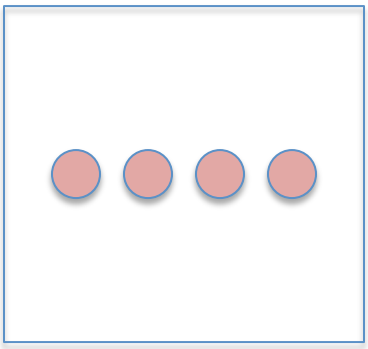
- WHAT IS DIVISION
- DIVISION WITH MANIPULATIVES
- MULTIPLICATION CHART USE MANIPULATIVES
- DIVISIONS SOLVE

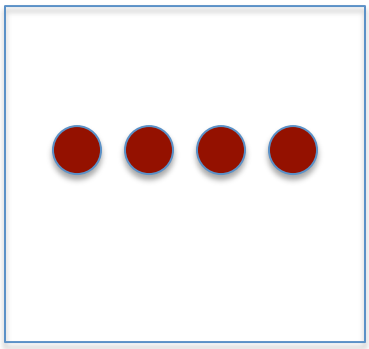
WHAT IS DIVISION

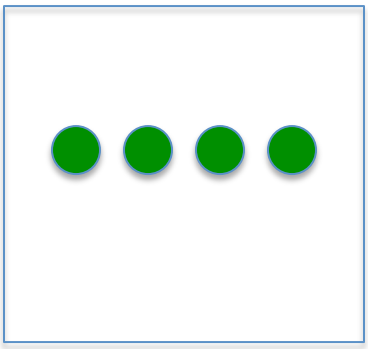
- The division is a method of distributing a group of things into equal parts; it is the opposite of multiplication
- Example if we have 16 circles, how do we share them equally in the given 4 boxes

https://www.khanacademy.org/math/arithmetic-home/multiply-divide/division-intro/v/division-1 - Introduction to Division Video









DIVISION WITH MANIPULATIVES

- In the following Chart – you are given a certain number of Stars – *fill in the number of stars and Split them in equal groups – divisions without and with Reminders (left overs)*

Number of Stars	*Split into Groups*	*Answer*
8 * * * * * * * *	2 groups	* * * * 4 each group * * * *
12	4 groups	
15	3 groups	
20	4 groups	
25	5 groups	
35	7 groups	

27	3 groups	
40	4 groups	
18	3 groups	
56	8 groups	
13	2 groups Remainder _	
37	5 groups Remainder _	
60	7 groups Remainder _	
40	6 groups	
23	5 groups Remainder	

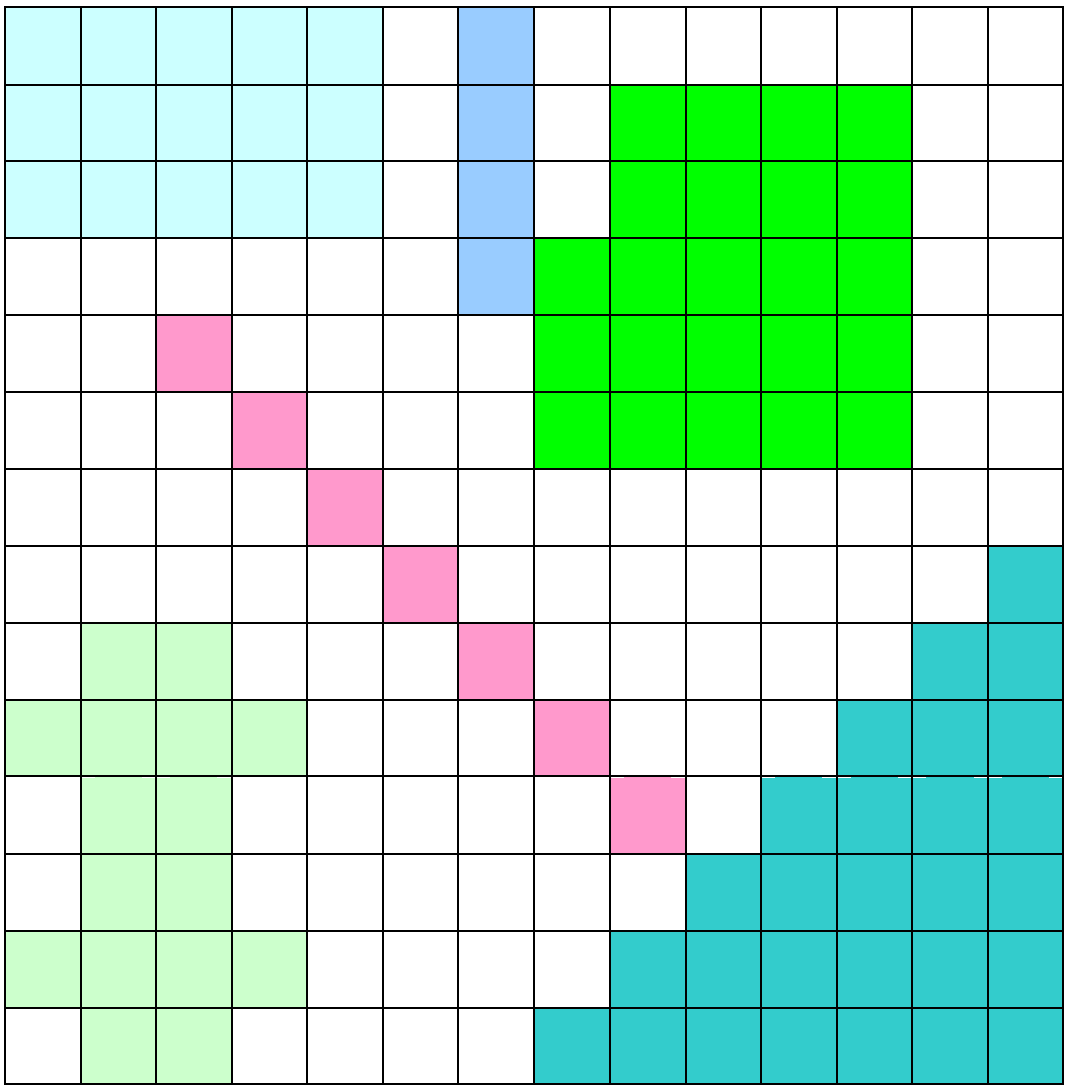
PERIMETER AND AREA

- PERIMETER AND AREA – SQUARE UNITS
- PERIMETER AND AREA – 2 D SHAPES
- 3D SHAPES –
- TYPES OF 3D SHAPES – VOLUME OF 3D SHAPES
- SURFACE AREA – 3D SHAPES
- WHAT IS VOLUME
- CALCULATE VOLUME

PERIMETER AND AREA – SQUARE UNITS

HOW MANY SQUARES DO THE SHAPES TAKE? (SQUARE UNITS)
Count the Square Units(Area) and the Sides for each shaded Shape

PERIMETER – ADDING UP THE SIDES



AREA – HOW MUCH SPACE IN A MEASURED UNIT SQUARE DOES THE SHAPRE TAKE

Light Blue – Pink -

Indigo – Teal Sharp Green

PERIMETER AND AREA – SQUARE UNITS

- 2 D SHAPES

PERIMETER AND AREA – COUNTING SQUARE UNITS
PERIMTER AND AREA – 2 D SHAPES (TRAINGLE, SQUARE, RECTANGLE, TRAPEZOID)

- 3 D SHAPES
  TYPES OF 3 D SHAPES
  VOLUME OF 3 D SHAPES

PERIMETER AND AREA – SQUARE UNITS

- *In the given Table – make between 4 and 6 shapes of your own choice – and list their Area and Perimeter; The answer set on the following page*

Perimeter and Area of Your Shapes:

Shape 1- Square units - ; Perimeter =

Shape 2 – Square units - ; Perimeter =

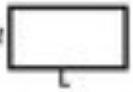
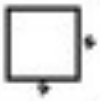
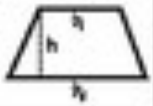
Shape 3 - Square units - ; Perimeter =

Shape 4- Square units - ; Perimeter =

Shape 5– Square units - ; Perimeter =

Shape 6 - Square units - ; Perimeter =

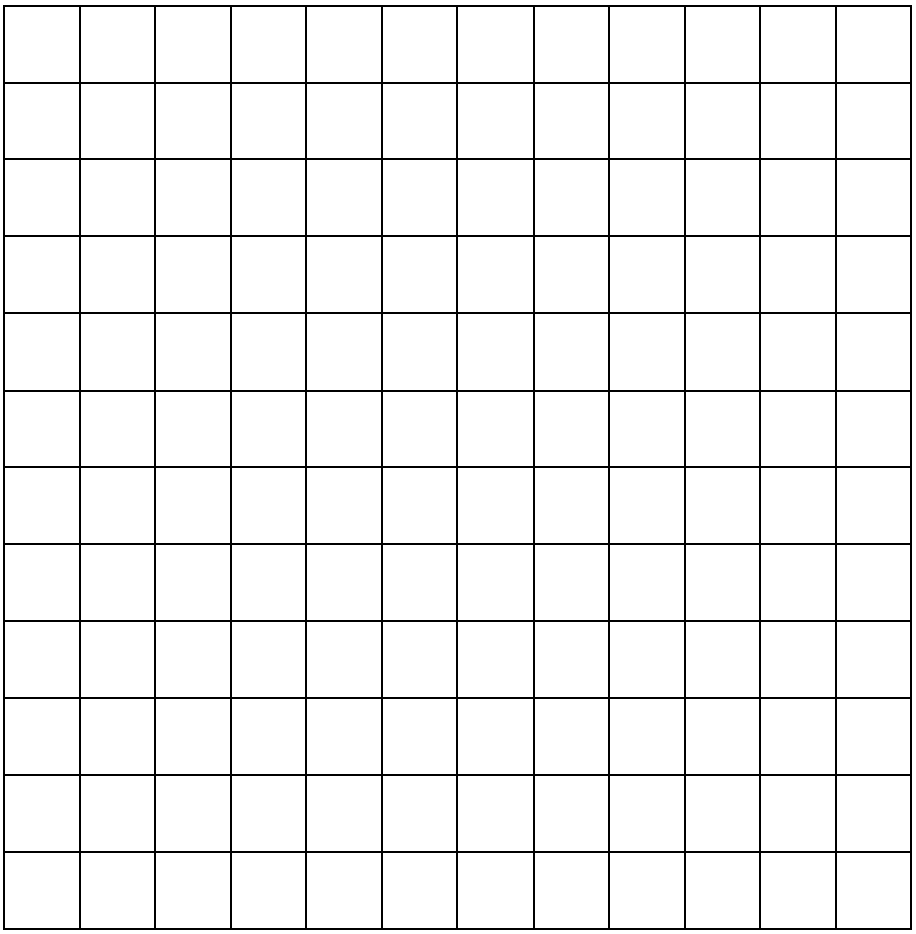
Area & Perimeter Formulas

Shape	Area	Perimeter
Circle 	$A = \pi r^2$	Circumference $C = \pi d = 2\pi r$
Parallelogram 	$A = b \times h$	$P = 2b + 2s$
Rectangle 	$A = L \times W$	$P = 2L + 2W$
Rhombus 	$A = \frac{(d)(d)}{2}$	$P = 4s$
Square 	$A = s^2$	$P = 4s$
Trapezoid 	$A = \frac{(b_1+b_2)h}{2}$	$P = b_1 + b_2 + s_1 + s_2$
Triangle 	$A = \frac{bh}{2}$	$P = s_1 + s_2 + s_3$

HOW MANY SQUARES DO THE SHAPES TAKE?

(SQUARE UNITS)

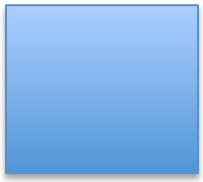
- *Draw a square, rectangle, parallelogram an trapezoid within the fiven table and see how many square units it takes*



PERIMETER AND AREA – Triangle

Triangle1: *Side 1- 7cm* *Side 2- 10cm* *Side 3 – 5cm* *Height- 7cm*	*Perimeter*	*Area*	*Calculations*
Triangle2: *Side 1,2 - 5cm* *Side 2- 4cm* *Height- 5 cm* *Isosceles;*	*Perimeter*	*Area*	*Calculations*
Triangle3: *Base 1- 12cm* *Base 2- 5cm (height)* *Side 3 – 13cm* *Right Triangle*	*Perimeter*	*Area*	*Calculations*

PERIMETER AND AREA – SQUARE

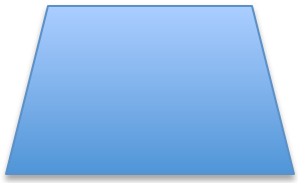


Square1: Side 1- 5cm	Perimeter	Area	Calculations
Square 2: Side 1- 7cm	Perimeter	Area	Calculations
Square 3: Side 1- 10 cm	Perimeter	Area	Calculations

PERIMETER AND AREA - RECTANGLE

Rectangle1: Length – 5 cm Width- 3cm (Height-H)	Perimeter	Area	Calculations
Rectangle 2: Length – 10 cm Width- 4cm (H)	Perimeter	Area	Calculations
Rectangle 3: Length – 7 cm Width – 3 cm	Perimeter	Area	Calculations

PERIMETER AND AREA – TRAPEZOID



Rectangle1:	Perimeter	Area	Calculations
Long Base – 13 Short Base – 7 cm Height -5 cm Sides 4 cm			
Rectangle 2: Long Base – 8m Short Base 5 m Side 1- 4m (H) Side 2 – 5m	Perimeter	Area	Calculations
Rectangle 3: Long Base -8cm Short Base -6 cm Height – 10cm Sides 5 cm	Perimeter	Area	Calculations

PERIMETER AND AREA – PARALLELOGRAM

Parallelogram 1: Base 1 -6cm Base 2 – 5cm Height -5 cm	Perimeter	Area	Calculations
Parallelogram 2: Base 1- 10 Base 2- 5 cm Height -7cm	Perimeter	Area	Calculations
Parallelogram 3: Base 1 – 8cm Base 2- 7cm Height – 4cm	Perimeter	Area	Calculations

3 D SHAPES

In geometry, a three-dimensional shape can be defined as a solid figure or an object or shape that has three dimensions – length, width and height. Unlike two-dimensional shapes, three-dimensional shapes have thickness or depth. Examples -

PYRAMID

CUBE

CONE

SPHERE

TRIANGULAR PRISM

CYLINDER

3 D SHAPES

PYRAMID

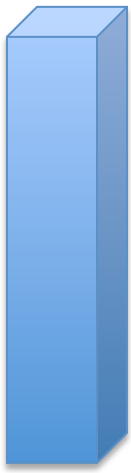
CUBE

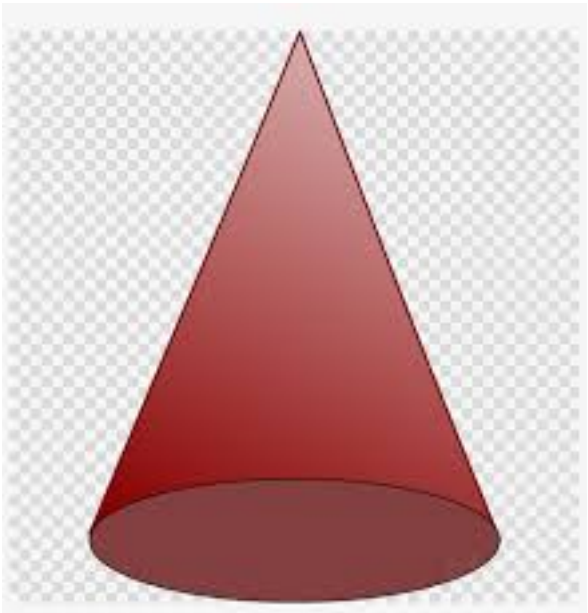
CONE

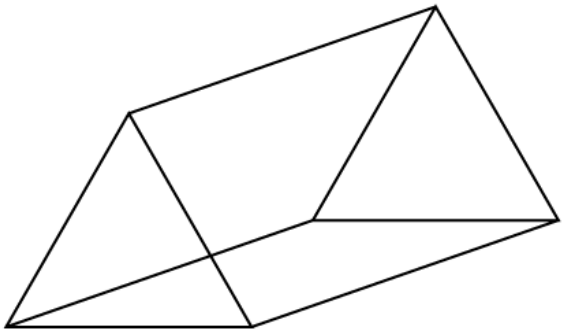
SPHERE

TRIANGULAR PRISM

CYLINDER



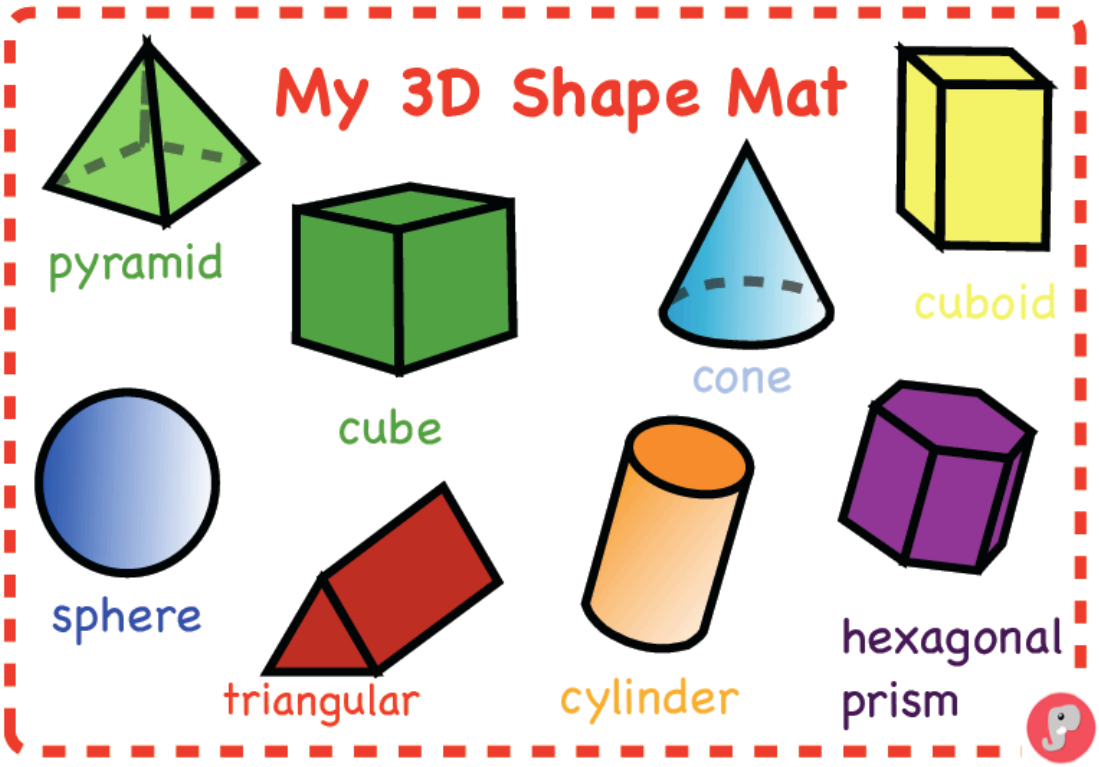




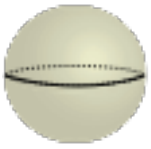
Briefly Look at the Shapes; describe the given Shapes – first one is done for you;

Shape	*Form*	*Sides/ Base*
Pyramid	4 triangle sides – with height	Triangle base; 4 sides – triangle
Cube		
Cone		
Sphere		
Triangular Prism		
Cylinder		

TYPES OF 3 D SHAPES



3 D SHAPES PROPERTIES

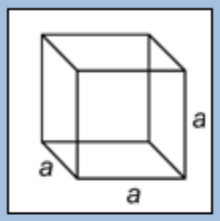
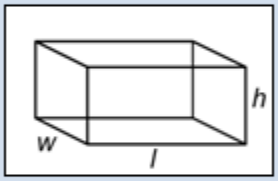
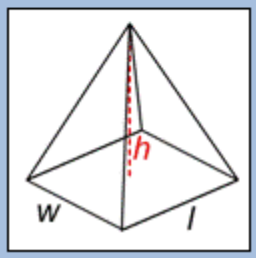
Name of 3D shape:	**Picture of 3D shape:**	**Attributes:**
Cube		Faces - 6 Edges - 12 Vertices - 8
Rectangular Prism or Cuboid		Faces - 6 Edges - 12 Vertices - 8
Sphere		Curved Face - 1 Edges - 0 Vertices - 0
Cone		Flat Face - 1 Curved Face - 1 Edges - 1 Vertices - 1
Cylinder		Flat Face - 2 Curved Face - 1 Edges - 2 Vertices - 0

VOLUME OF 3D SHAPES:

WE MUST CALCULATE THE AREA FIRST OF THE BASE – AND THEN MULTIPLY BY HEIGHT:

VOLUME OF 3D SHAPE – IS THE AREA HEIGHT*

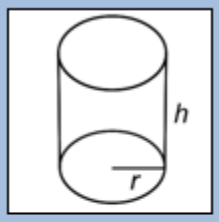
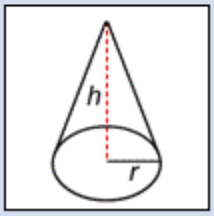
FOR PRISMS - Keep in mind that all cubes are actually rectangular prisms, so our formula for finding a cube's volume is the area of the cube's base times its height.

Name	Transparent Form	Volume Formula
Cube		$V = a \cdot a \cdot a = a^3$ a = the length of one side
Rectangular prism		$V = l \cdot w \cdot h$ l = length w = width h = height
Pyramid		$V = \frac{l \cdot w \cdot h}{3}$ l = length w = width h = height

For Rounded Shapes (area is a Circle)

A cylinder's volume is the area of the base (πr^2) times the height (h).

Let's compare the formula for the volume of cones ($V = \frac{\pi \cdot r^2 \cdot h}{3}$) with the formula for a pyramid's volume: ($V = \frac{l \cdot w \cdot h}{3}$). Well, we can see that the numerator of cone formulas is the same as the volume formula for cylinders and that the numerator of pyramid formulas is the same as the volume formula for rectangular prisms.

Name	Transparent Form	Volume Formula
Cylinder		$V = \pi \cdot r^2 \cdot h$ r = radius h = height
Cone		$V = \frac{\pi \cdot r^2 \cdot h}{3}$ r = radius h = height

Name	Wireframe Form	Volume Formula
Sphere		$V = \frac{4}{3}\pi r^3$ r = radius

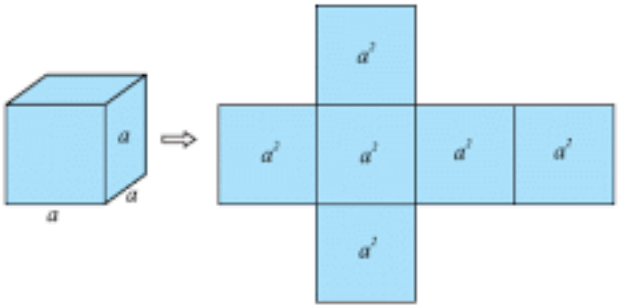
SURFACE AREA

Surface Area is the Sum of the all Areas in each given 3 D Shape

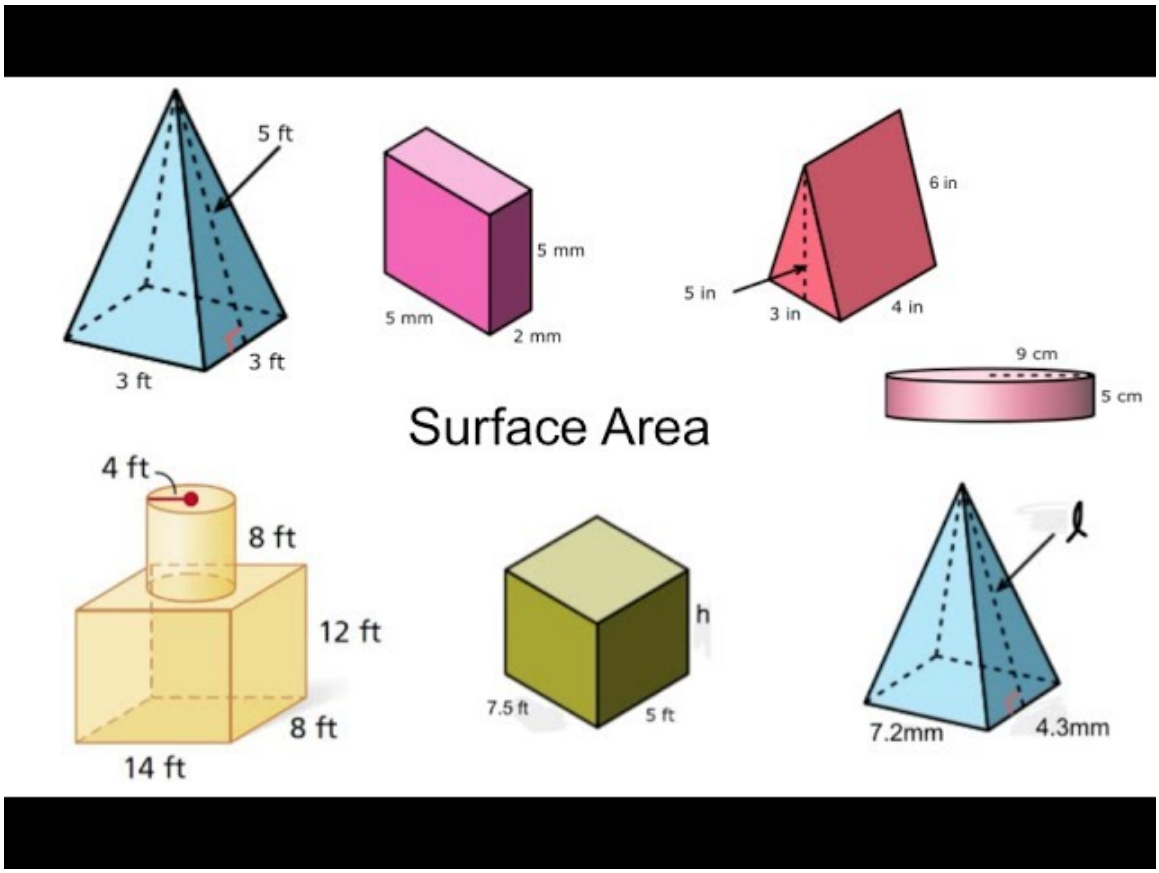
Example – in order to find the Area of a Cube you must "open" each surface – and since the areas in a cube are identical – you calculate one area and multiply by 6;

Surface Area of a Cube = $6a^2$

where a is the edge of the cube.



https://www.youtube.com/watch?v=Kk7lpQMOuaM - examples of calculating Surface Areas



Calculate the Surface Area of the Shapes Above; use meters or cm (metric system) instead of feet; show all calculations on separate piece of paper

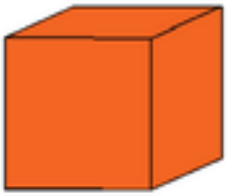
- *Triangular pyramid* (first left) - blue- 1 square face – 4 triangles
- *Rectangular prism* –purple – 6 rectangular faces
- *Triangular prism* –- pink - 3 rectangular and 2 triangle faces
- *Cube* – green – 6 square faces

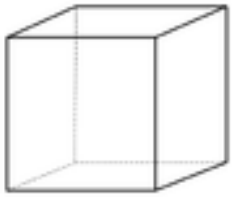
VOLUME

- *What is Volume?*
- *Volume is the Measure of Space take up be a Solid Object*
- *To calculate Volume is we multiply the Area Base of a Shape by its Height*
- *Volume is Base *Height*

What is volume?

Volume is the measure of space taken up by a solid object.



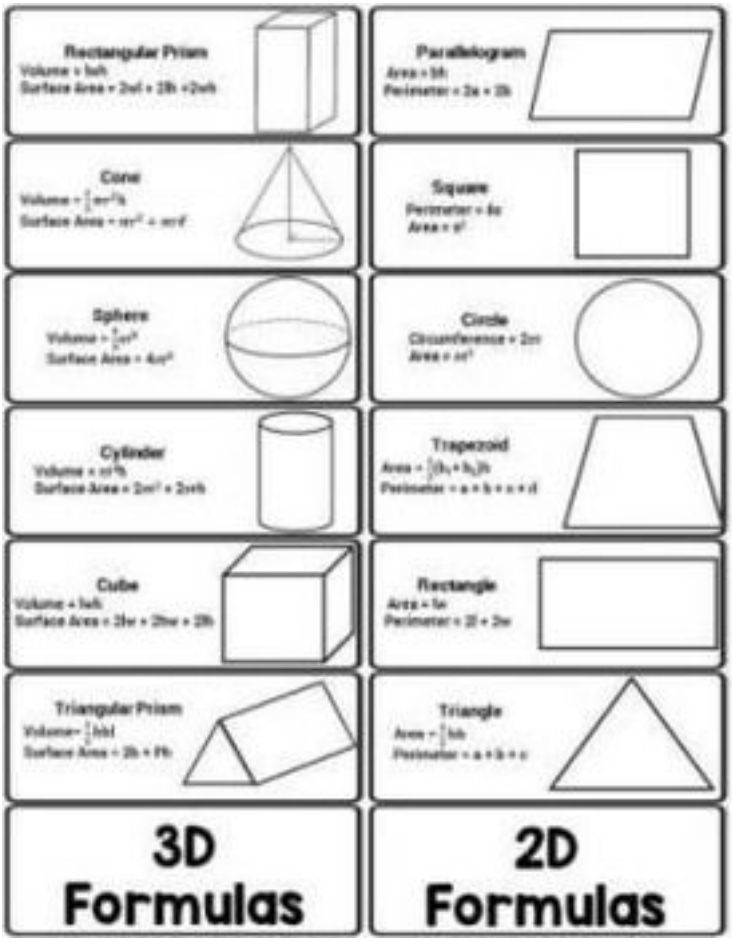


To measure volume we use cubic centimetres or cubic metres. We write it like this

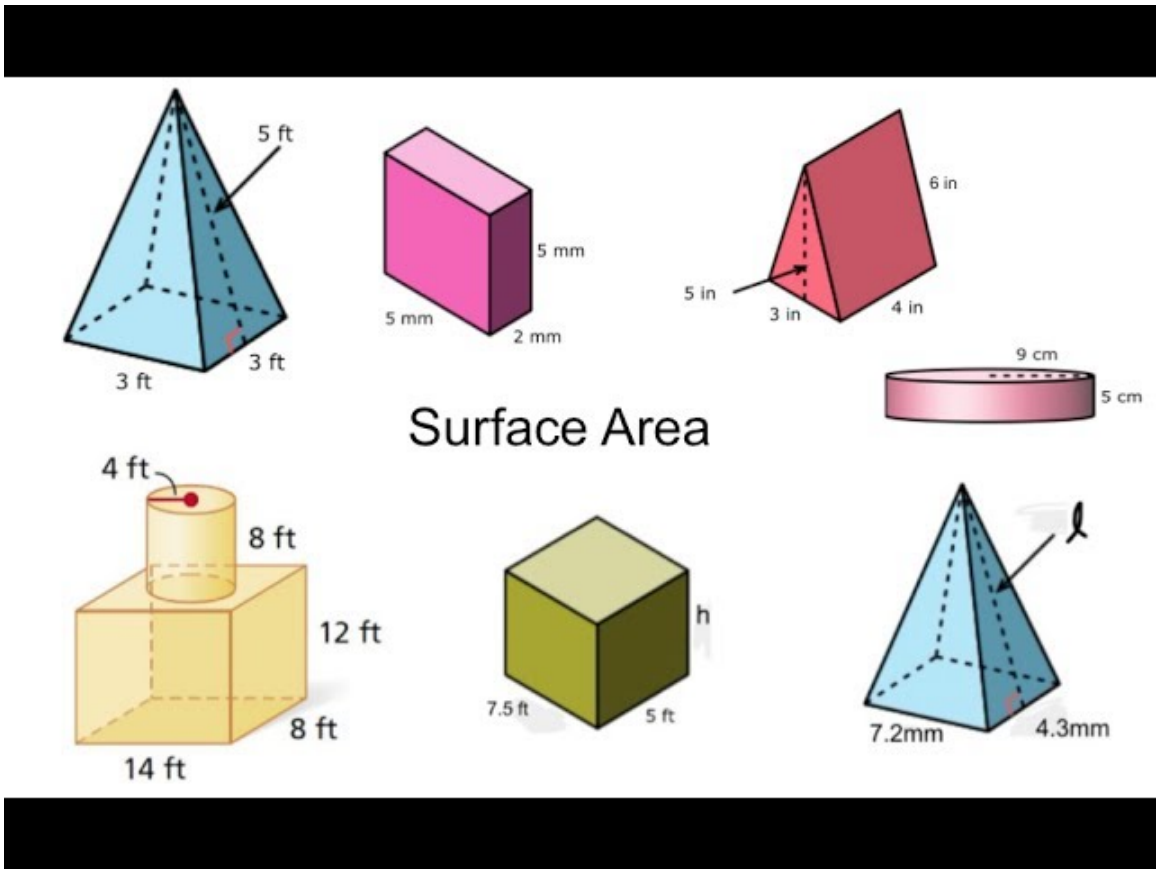
cm^3

VOLUME FORMULAS REVIEWS

- *Volume is Area Base *Height*
- *So the Calculation varies based on the shape of the base, which could be a square, rectangle, triangle or circle *(times) the Height of the Shape*



CALCULATE VOLUME

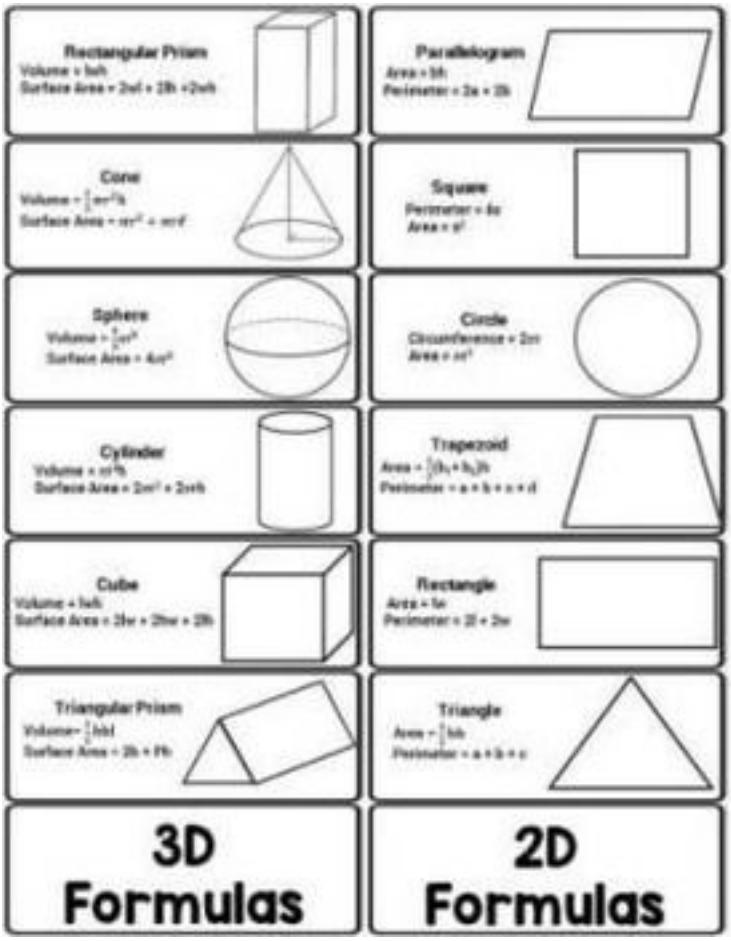


Calculate VOLUME of the Shapes Above; use meters or cm (metric system) instead of feet; show all calculations on separate piece of paper – or use the chart below

- *Triangular pyramid* (first left) - blue
- *Rectangular prism* –purple
- *Triangular prism* –- pink
- *Cylinder - Pink*
- *Cube* – green
- *Cube and Cylinder*

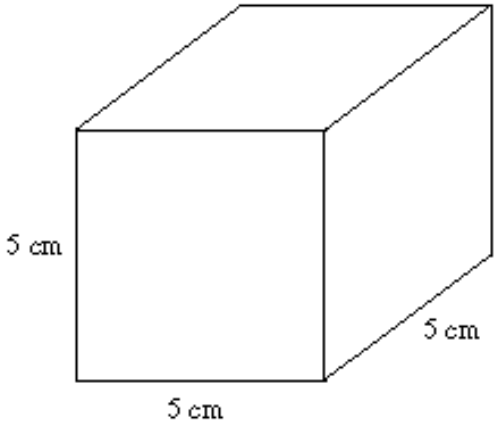
SHAPE	AREA BASE	HEIGHT	VOLUME
Triangular Pyramid – blue left			
Rectangular Prism – purple			
Triangular prism - pink			
Cylinder – pink			
Cube – green			
Triangular Pyramid – right			

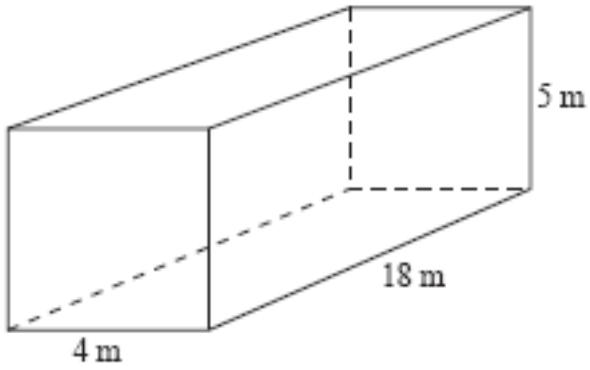
CALCULATE VOLUME - 2

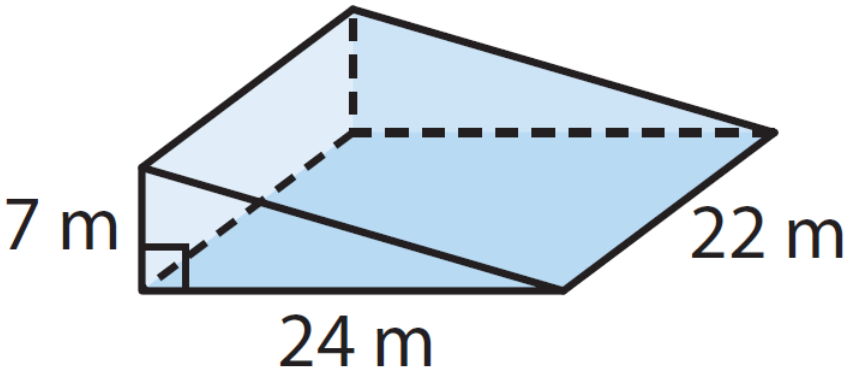


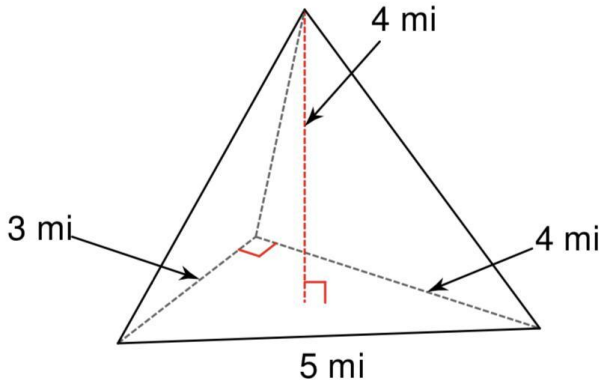
CALCULATE VOLUME

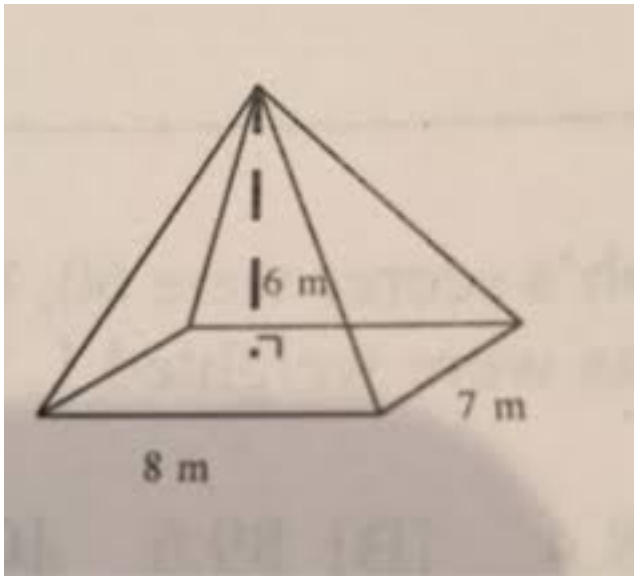
Calculate Volume for the given Shapes

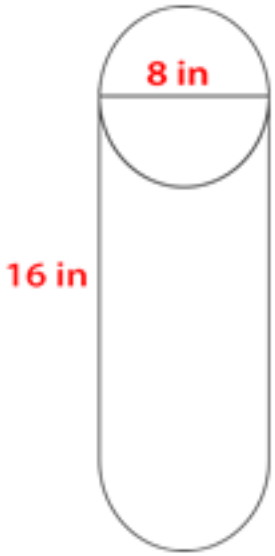


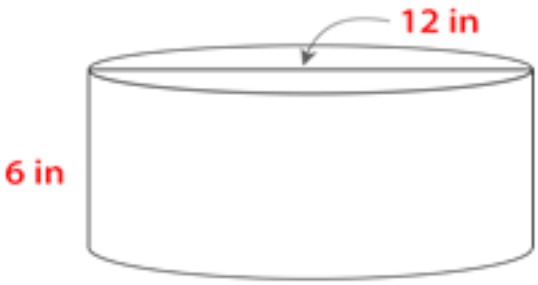





4 mi
3 mi
4 mi
5 mi


6 m
7 m
8 m


8 in
16 in


12 in
6 in

WHAT ARE INTEGERS

- WHAT ARE INTEGERS
- OPERATIONS WITH INTEGERS
- ADDING AND SUBTRACTING INTEGERS
- MULTIPLYING INTEGERS

WHAT ARE INTEGERS?

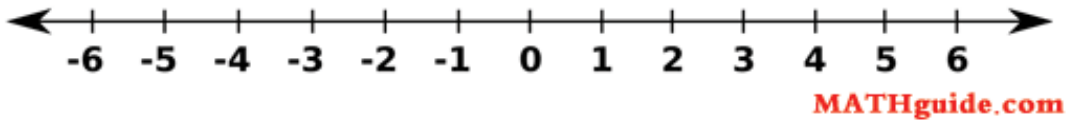
Integers are like whole numbers, but they **also include negative numbers** ... but still no fractions allowed!

So, integers can be negative {−1, −2,−3, −4, ... }, positive {1, 2, 3, 4, ... }, or zero {0}
We can put that all together like this:

Integers = { ..., −4, −3, −2, −1, 0, 1, 2, 3, 4, ... }

Examples: −16, −3, 0, 1 and 198 are all integers.
(But numbers like ½, 1.1 and 3.5 are **not** integers)

Integers Number Line



Name	Numbers	Examples
Whole Numbers	*{ 0, 1, 2, 3, 4, ... }*	*0, 27, 398, 2345*
Counting Numbers	*{ 1, 2, 3, 4, ... }*	*1, 18, 27, 2061*
Integers	*{ ... −4, −3, −2, −1, 0, 1, 2, 3, 4, ... }*	*−15, 0, 27, 1102*

*And everyone agrees on the definition of an **integer**, so when in doubt say "integer".*

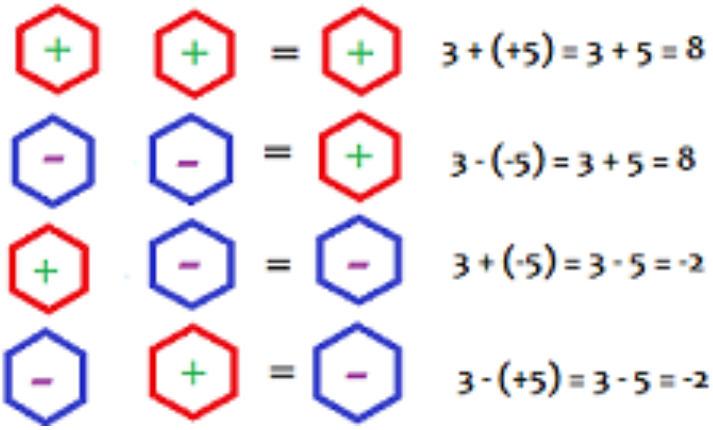
And when you only want positive integers, say "positive integers". It is not only accurate, it makes you sound intelligent. Like this (note: zero isn't positive or negative):

- *Integers = { ..., −4, −3, −2, −1, 0, 1, 2, 3, 4, ... }*
- *Negative Integers = { ..., −4, −3, −2, −1 }*
- *Positive Integers = { 1, 2, 3, 4, ... }*
- *Non-Negative Integers = { 0, 1, 2, 3, 4, ... }* (includes zero, see?)

OPERATIONS WITH INTEGERS

ADDING AND SUBTRACTING INTERGERS (+,-)

- Adding two positive numbers is always positive
- Adding two negative numbers – is always a higher negative
- Subtracting two numbers – it takes the Sign of the higher number
- A minus in front of the brackets changes the number of the integer to its oppose – ex –(+3)=-3 and –(-3)=+3=3



Multiplying and dividing INTERGERS (* ,/)

- Multiplying 2 postive numbers always positive
- Multiplying 2 Negative Numbers always Positive
- Multiplying a Positive Number with a Negative (or vice versa) – is Negative Sign

OPERATIONS WITH INTEGERS REVIEW CHART

Rules For Addition	
Positive + Positive 3+5=8	Positive
Positive +Negative Ex.7+ (-8)=-1; takes – because 8 higher than 7, although -8 is smaller than 7	Sign of the higher number
Negative plus Positive -8 +7=-1	Sign of the higher number
Negative Plus Negative -5 +(-5)=-5-5=-10	Negative

Rules For Multiplication	
Positive * Positive 5*3=15	Positive
Positive *Negative 5* (-3)=-15	Negative
Negative * Positive (-5)*3=15	Negative
Negative* Negative (-5)*(-3)= -15	Negative

ADDING AND SUBTRACTING INTERGERS (+,-)

#	Adding/ Subtracting	Answer
1	7+5 =	
2	7+ (-5)=	
3	2+(-5)=	
4	10 + (-20)=	
5	10+ (+4)=	
6	(-5)+(-10)=	
7	(-5)+ (-8)=	
8	(-7)+ 10=	
9	0 +(-12) =	
10	0+12 =	
11	12+ (-20)=	
12	-50 + (+50)=	
13	23 -23 =	
14	77+ (-80)=	
15	100+ (-25)=	

MULTIPLYING AND DIVIDING INTEGERS

#	Multiplying/Dividing	Answer
1	7* 5 =	
2	7* (-5)=	
3	2* (-5)=	
4	10 * (-20)=	
5	10 ÷ (-5)=	
6	(-5)*(-10)=	
7	(-20)÷ 4=	
8	(-7)*10=	
9	0 * (-12) =	
10	(-55)÷ (-11)=	
11	25 * (-4)=	
12	-100 ÷ 25=	
13	-100 ÷ (-50)=	
14	77* (-15)=	
15	225 ÷ (-25)=	

FRACTIONS

- WHAT ARE FRACTIONS?
- SIMPLIFYING FRACTIONS
- HOW TO ADD, SUBTRACT, MULTIPLY AND DIVIDE FRACTIONS
- ADDING FRACTIONS
- SUBTRACTING FRACTIONS
- MULTIPLYING FRACTIONS
- DIVIDING FRACTIONS

WHAT ARE FRACTIONS?

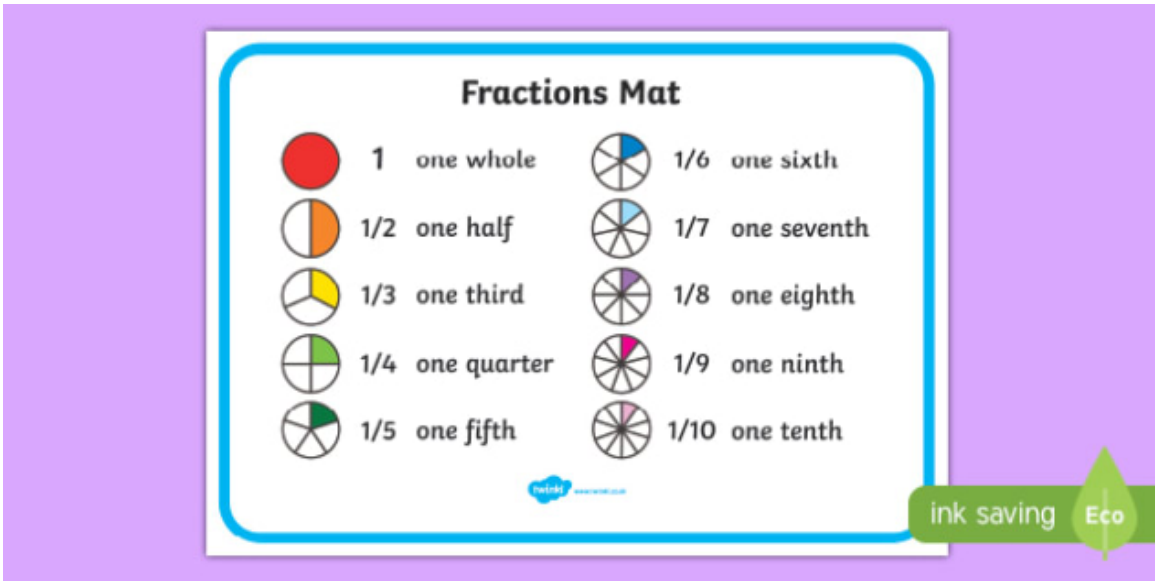
- Fractions are a small or tiny part, amount, or proportion of something.
- *Fractions are Parts of whole things – we use fractions every day*

Example – a Quarter or a chocolate is written as ¼ (1 part out of 4 parts)
Or an eighth of a pizza is written as 1/8 (1 part out of 8 parts)

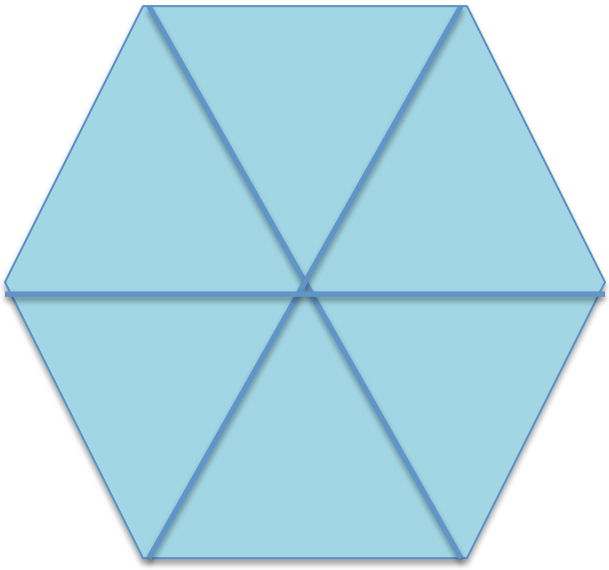
1 - 1 is the *Numerator* (the number of parts being thought of)
4 - 4 is the *Denominator* - # of equal parts the whole number is divided into

FRACTIONS ILLUSTRATED

Example of Fractions as parts of a whole



A hexagon could be split in 6 parts /triangles – 1/6 is a Triangle
2 triangles are 2/6, 3 triangles are 3/6 and so on



SIMPLIFYING FRACTIONS

	Simply given Fractions	Divides by
1	2/8 =1/4	2 ~ 2/2=1 and 8 /2=4
2	6/18 =	
3	5/50 =	
4	3/12=	
5	8/16=	
6	4/20=	
7	6/24 =	
8	7/21=	
9	9/45 =	
10	10/100=	
11	2/18=	
12	12/16 =	
13	20/24=	
14	15/45=	

15	18/36=	
16	7/49 =	
17	24/40=	
18	16/64=	
19	18/81=	
20	30/50=	

ADDING FRACTIONS

- Adding fractions means to add parts of something
- *If the fractions have the same base (denominator) – we just add the numerators, keep the same base*

Example:

1/ 3 + 2/3 =3/3

4/10+ 3/10 =7/10

- *If they have different denominators – we look for least common multiple – or we times the denominators by each other for the base – and we times the numerators by the opposite denominators and add them up;*

Example:

- *1 /2 + 1/3 =*
- *we times 2*3=6 – that's the new common base (denominator)*
- *then on Numerators side we times by the opposite denominator –*

*1 *3=3 then 1 *2=2*

- *Add the new Numerators – 2+3=5*

So our fraction is 5/6

1/2 + 1/3 = 3/6+ 2/6 =5/6

SUBTRACTING FRACTIONS

- Subtracting fractions means to subtract parts of something
- *If the fractions have the same base (denominator) – we just subtract numerators, keep the same base*

Example:

- *7/10 - 2/10 =5/10*
- *6/8 - 3/8 =3/8*

If they have different denominators – we look for least common multiple – or we times the denominators by each other for the base – and we times the numerators by the opposite denominators and then subtract them;

*7/5 - 3/6 = (7*6)/30 – (3*5)/30 =42/30- 15/30 = 27/30*

- *we multiply the Denominators – 5*6=30 – so base is 30*
- *we multiply the Numerators by the opposites base: 7*6= 42 and 3*5 =15 ,then and subtract new numerators: 42-15= 27*

MULTIPLYING FRACTIONS

To multiply Fractions – we multiply the Numerators and the Denominators of each Fraction

*3/4 * 6/7 = (3*6) / (4*7)= 18/28 – which could be further simplified –- (divide both numerator and denominator by 2) to get 9/14- but this is an acceptable answer*

DIVIDING FRACTIONS

To divide Fractions – we multiply the first fraction by the Opposite of the second (Inverting the Numerator with the denominator)

Example:

*3/4 divided by / 6/7 = ¾ * 7/6 we inverted the denominator and numerator)= (3*7)/ (4*6)= 21/24, or divide by a common multiple like 3 = 7/8*

ADDING FRACTIONS

	Add the given fractions; show your denominators	*Calculations*
1	*Same denominator* 1/5+ 2/5 =	
2	6/7+ 1/7 =	
3	6/12+3/12=	
4	4/6+3/6 =	
5	*Different denominators* 3/2+ ¼ =	
6	4/6 +2/9=	
7	6/8 + 4/10 =	
8	9/4 + 6/5 =	
9	4/5 +9/10 =	
10	7/10 +3/4 =	

SUBTRACTING FRACTIONS

	Subtract the given fractions; show your denominators	*Calculations*
1	*Same denominator* 3/5 - 2/5 =	
2	6/7- 1/7 =	
3	6/12 - 3/12=	
4	4/6 - 3/6 =	
5	*Different denominators* 3/2 - ¼ =	
6	4/9 - 2/7 =	
7	6/8 - 4/10 =	
8	9/5 - 5/6 =	
9	4/7 - 2/9 =	
10	7/10 - 3/4 =	

MULTIPLYING FRACTIONS

	Multiply the given fractions;	*Calculations*
1	1/5* 2/5 =	
2	6/7*1/7 =	
3	6/12 * 4 /12=	
4	4/6* 3/5=	
5	3/2 * 1/ 4 =	
6	4/6 * 3/ 10=	
7	6/8 * 4/9 =	
8	9/4 * 6/5 =	
9	4/5 * 9/10 =	
10	7/10* 3/4 =	

DIVIDING FRACTIONS

	Multiply the given fractions;	*Calculations*
1	1/5 ÷ 2/5 =	
2	6/7 ÷ 1/7 =	
3	6/12 ÷ 4 /12=	
4	4/6 ÷ 3/5=	
5	3/2 ÷ 1/ 4 =	
6	4/6 ÷ 3/ 10=	
7	6/8 ÷ 4/9 =	
8	9/4 ÷ 6/5 =	
9	4/5 ÷ 9/10 =	
10	7/10 ÷ 3/4 =	

DECIMALS

- WHAT ARE DECIMALS
- IDENTIFYING DECIMALS
- ADDING DECIMALS
- SUBTRACTING DECIMALS
- MULTIPLYING DECIMALS

WHAT ARE DECIMALS?

Decimal numbers

A decimal is a way of writing a number that is **not whole.**

Decimal numbers are **'in between'** numbers. For example, 10.4 is in between the numbers 10 and 11. It is **more than** 10, but **less than** 11.

Take care when reading the values of decimal numbers.

4.2 means 4 and 2 tenths.

4.20 means 4 and 2 tenths and 0 one-hundredths. The last zero does not need to be there.

4.02 means 4 and 0 tenths and 2 one-hundredths.

Examples when using Money:
Most of the times we use decimals when dealing with money in regular life issues

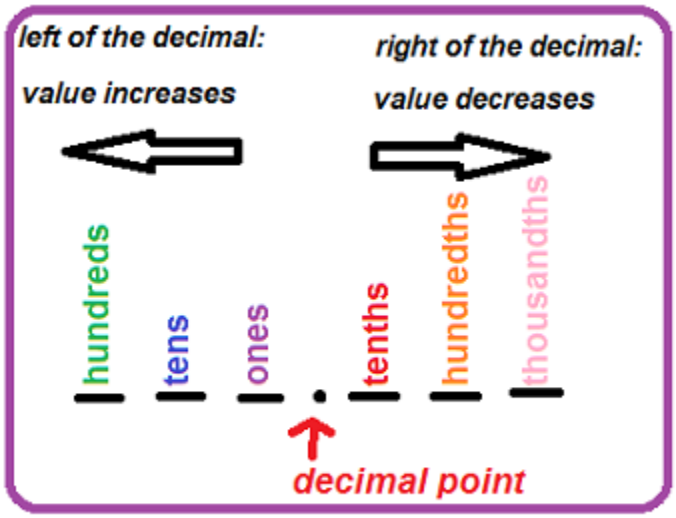
4.02 – 4 dollars and 2 cents

4.20 – 4 dollars and 20 cents

17.15 – 17 dollars and 15 cents

345.75 – 375 dollars and 75 cents

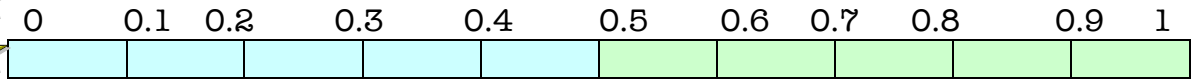
IDENTIFYING DECIMALS



Decimal Place Value

Example 1: Decimals split out of Number 1

If first number is 0 and last one is one – we are separating number one in 10 units



Number 1 split in dollar and cents

0 – zero dollars

0.1 (0) – is 1/10 of the number or 10 cents out of a dollar

0.2 - is 2/10 out of the number or *20 cents* out of a dollar

0.3– is 3/10 out of a number or 30 cents out of a dollar

0.4 - is 4/10 out of a number or 40 cents out a dollar

0.5– is 5/10 out of a number or 50 cents out of a dollar

0.6– is 6/10 out of a number or 60 cents out of a dollar

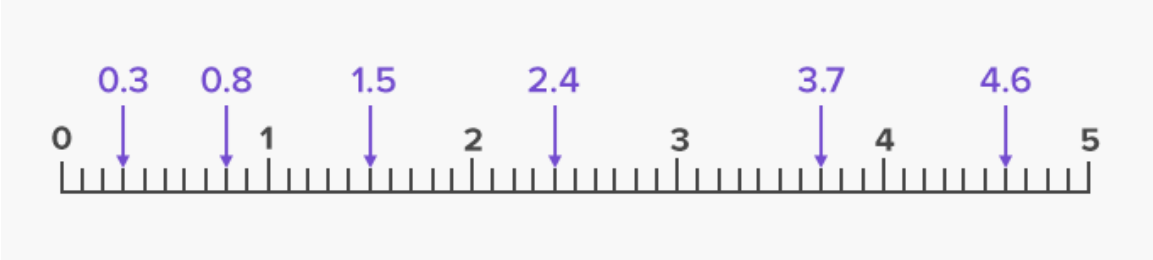
0.7– is 7/10 out of a number or 70 cents out of a dollar

0.8– is 8/10 out of a number or 80 cents out of a dollar

0.9– is 9/10 out of a number or 90 cents out of a dollar

1.0 - – is 10/10 out of a number or 1 dollar (100 cents)

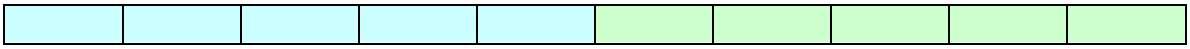
Example 2 - of placing Decimals on a Ruler



IDENTIFYING DECIMALS

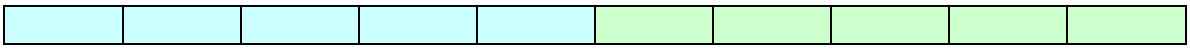
Place the decimals number on the given Number Lines and write down your new Numbers – express them as dollars and cents – as in previous example

5 5.1 6



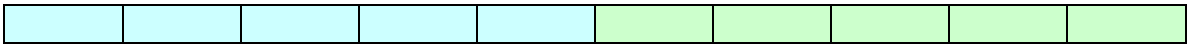
5 – 5 dollars
5.1 – 5 dollars 10 cents
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6

10 11



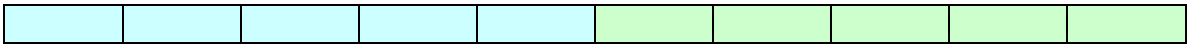
10 – 10 dollars
10.1 – 10 dollars 10 cents
10.2-
10.3 -
10.4 -
10.5 -
10.6 -
10.7 -
10. 8 -
10.9
11

76 77



76 – 76 dollars
76.1 – 76 dollars 10 cents
76.2-
76.3 -
76.4 -
76.5 -
76.6 -
76.7 -
76.8 -
76.9
77

345 346



345 – 345 dollars
345.1 – 345 dollars 10 cents
345.2-
345.3 -
345.4 -
345.5 -
345.6 -
345.7 -
345. 8 -
345.9
346

ADDING DECIMALS

Add the given decimals – make sure to align the units with units, tens with tens, hundreds and hundreds and so on – and use the decimal points under each other as not to confuse the whole numbers with the decimals in it.

3.5+ 7.0	8.6+ 9.4	6.12+ 7.20	17.43+ 5.29
37.5+ 7.0	83.6+ 9.4	26.49+ 17.60	29.43+ 30.09
35.5+ 62.0	38.6+ 34.4	15.12+ 46.20	37.43+ 22.29
345.5+ 7.0	805.6+ 93.4	609.12+ 725.20	171.43+ 537.81

Add the given decimals – *make sure to align the units with units, tens with tens, hundreds and hundreds and so on – and use the decimal points under each other as not to confuse the whole numbers with the decimals in it.*

	Calculate - Align in math format
7.8 -5.6 =	7.8- 5.6
10.7-5.4=	
17.5-12.9=	
25.5 -15.7 =	
86.2-47.1=	
94.75 – 68.30=	
64.5-33.2 =	
125.6-110.4=	

675.9- 635.2=	
847.6- 65.3=	

SUBTRACTING DECIMALS

Subtract the given decimals – make sure to align the units with units, tens with tens, hundreds and hundreds and so on – and use the decimal points under each other as not to confuse the whole numbers with the decimals in it.

7.0 - 3.5+	9.4- 8.6	7.20- 6.15	17.43- 5.29
37.5- 7.0	83.6- 9.4	26.49- 17.60	30.43- 29.00
92.5- 62.0	38.6- 34.4	46.21- 26.20	37.43- 22.29
345.5- 7.0	805.6- 93.4	735.12- 425.20	537.43- 142.81

Add the given decimals – make sure to align the units with units, tens with tens, hundreds and hundreds and so on – and use the decimal points under each other as not to confuse the whole numbers with the decimals in it.

	Calculate - *Align Vertically*
7.8 -5.6 =	7.8- 5.6
10.7-5.4=	
17.5-12.9=	
25.5 -15.7 =	
86.2- 47.1=	
94.75 – 68.30=	
64.5-33.2 =	
125.6-110.4=	

675.9- 635.2=	
847.6 - 65.3=	

MULTIPLYING DECIMALS

*Multiply the given decimals – you need to multiply like a regular multiplication, however at the end you need to count how many decimals you had in both numbers and then place the same number of decimals in the answer at the end; ex. – 7.3*5=365, 1 decimal (.3)- we place the decimal place one place from the right on 365 – it becomes 36.5*

7.3* 5 36.5	9.4* 8	7.2* 6.5	17.43* 5.29
37.5* 7	83.6* 9.4	26.49* 17	30.43* 26
92.5* 62	38.6* 32.4	46.21* 67	37.6* 22.9
345.5* 7	805.6* 9.4	735.12* 43.5	537.43* 142.81

Multiply the given decimals – *you need to multiply like a regular multiplication, however at the end you need to count how many decimals you had in both numbers and then place the same number of decimals in the answer at the end;*

	Calculate - *Align Vertically*
7.8 *5.6 =	7.8* 5.6
10.7 * 5.4=	
17.5*12.9=	
25.5 * 15.7 =	
86.2 *47.1=	
94.75 * 68.30=	
64.5 * 33.2 =	
125.6* 110.4=	

675.9 * 635.2=	
847.6 * 65.3=	

PERCENT

- WHAT IS PERCENT
- CALCULATING PERCENT
- CALCULATING PERCENT – PRACTICE TABLES

WHAT IS PERCENT?

A part or a Number out of Every 100 parts –
It is expressed as a percentage sign – like 7% or as a fraction 7/100

Example:

7 out of 100 – if you have 100 – then 7% is 7
if you have 200 – then 7 % - is 7 from first 100, then 7 from second hundred – that is 14

	7%	10%
100	7	10
200	7+7=14	10+10=20
300	7+7+7=21	10+10+10=30
400	28	40
500	35	50
600	42	60
700	49	70
800	56	80
900	63	90
1,000	70	100

CALCULATING PERCENT:

7% out of 200
– can be calculated as 7+7 =14
*or – as 7/100 *200 =14*
*or 7/100 ***200 =0.07***200 =14*

7 % out of 525 is better calculated as a fraction or decimal form as the number is not exact to be able to add it exactly:

*Example 7/100 out of 525 is 0.07*525 = 36.75*
*It can be approximated as 7*5 is 35 – but that would not be the exact figure;*

Calculating Percent – Practice Tables

*In the given Tables, calculate the percent for the given numbers show your work – example – 3% of 500 is 3+3+3+3+3=15 or 3*5 is 15*

Table 1- PERCENT

	1%	2%	3%
125			
250			
350			
460			
570			
650			
770			
850			
940			
1,000			

Table 2 – PERCENT

	4%	5%	6%
105			
220			
330			
440			
550			
650			
775			
820			
980			
1,000			

Table 3 - PERCENT

	7%	8%	9%	10%
100				
236				
338				
457				
500				
650				
770				
816				
940				
1,000				

FRACTIONS, DECIMALS, PERCENT

- CONVERT FRACTIONS INTO DECIMALS AND PERCENT (EVERY FRACTION IS A DIVISION)
- TABLES 1 AND 2 – EXAMPLES AND PRACTICE
- CONVERSIONS TABLES 3&4 - PRACTICE

FRACTIONS, DECIMALS, PERCENT

Every Fraction is a Division

Example ½ is *1 divided by 2 or 0.5* -
while *0.5 is 5/10 or 50/100 – or 50% - half of a hundred*

Table 1 -

#	*Fractions*	*Decimal* *(divide)*	*Percent* *(out of 100)*
1	$\frac{1}{2}$	0.5	$\frac{50}{100}$
2	$\frac{4}{5}$	0.8	$\frac{80}{100}$
3	$\frac{20}{50}$	0.4	$\frac{40}{100}$
4	$\frac{7}{35}$ $\frac{1}{5}$	0.2	$\frac{20}{100}$
5	$\frac{16}{24}$ $\frac{4}{6}$	0.66	$\frac{66}{100}$

FRACTIONS, DECIMALS, PERCENT

Convert the following – from fractions to decimals to percent- show your divisions on a separate piece of paper

Table 2

#	*Fractions*	*Decimal* *(divide)*	*Percent* *(out of 100)*
1	$\frac{1}{3}$		
2	$\frac{1}{5}$		
3	$\frac{1}{6}$		
4	$\frac{1}{7}$		
5	$\frac{1}{8}$		
6	$\frac{1}{9}$		
7	$\frac{10}{10}$		
8	$\frac{25}{75}$		
9	$\frac{33}{66}$		
10	$\frac{60}{80}$		

FRACTIONS, DECIMALS, PERCENT

Convert the following – from fractions to decimals to percent- show your divisions on a separate piece of paper

Table 3

#	*Fractions*	*Decimal* *(divide)*	*Percent* *(out of 100)*
1	$\frac{15}{30}$		
2	$\frac{40}{50}$		
3	$\frac{5}{20}$		
4	$\frac{7}{49}$		
5	$\frac{6}{30}$		
6	$\frac{6}{48}$		
7	$\frac{50}{50}$		
8	$\frac{50}{75}$		
9	$\frac{33}{99}$		
10	$\frac{60}{80}$		

FRACTIONS, DECIMALS, PERCENT

Complete the table - you may have to switch the order of completing things based on the data given – show calculations on a separate piece of paper

Table 4

#	*Fractions*	*Decimal* *(divide)*	*Percent* *(out of 100)*
1		0.2	
2		0.35	
3		0.58	
4	$\frac{25}{65}$		
5	$\frac{37}{74}$		
6	$\frac{80}{90}$		
7	$\frac{9}{81}$		
8			25%
9			47%
10			75 %

EXPONENTS AND SQUARE ROOTS

- WHAT ARE EXPONENTS (EX 5^3)
- OPERATIONS WITH EXPONENTS - RULES (+,-, *, ÷)
- WHAT ARE SQUARE ROOTS (NUMBER MULTIPLIED BY ITSELF OR TO THE POWER OF 2- EX 5^2=5*5=25)
- SQUARE ROOTS TO 100 TABLE
- HOW TO EXTRACT A SQUARE ROOT

EXPONENTS & SQUARE ROOTS

What are Exponents (a number to the power of another number) – is a fancy term for Repeated Multiplication– we will use the sign ^ for powers – ex 2^3 – is read 2 to the power of 3 (2 multiplied by itself 3 times) –

Examples:

*2^3 = 2*2*2= 4*2=8 (2 is called the Base – and 3 is called the Exponent)*

*3^5 = 3*3*3*3*3= 9*9*3=243*

*5 ^4= 5*5*5*5 =25* 25= 625*

*12^3= 12*12*12= 144*12 =1728*

OPERATIONS WITH EXPONENTS(+,-, *, /)

ADDING AND SUBTRACTING EXPONENTS

Adding exponents and subtracting exponents really doesn't involve a rule. If a number is raised to a power, add to another number raised to a power (with either a different base or different exponent) by calculating the result of the exponent term and then directly adding this to the other. When you're subtracting exponents, the same conclusion applies: simply calculate the result if you can and then perform the subtraction as usual. If both the exponents and the bases match, you can add and subtract them like any other matching symbols in algebra. For example, $x^y + x^y = 2\_x^y$ *and* $3\_x^y - 2\_x^y = \_x^y$.

MULTIPLIYING AND DIVIDING EXPOPENTS

MULITPLY / DIVIDE

Multiply two numbers with exponents by adding the exponents together: $x^m \times x^n = x^{m+n}$

Divide two numbers with exponents by subtracting one exponent from the other: $x^m \div x^n = x^{m-n}$

When an exponent is raised to a power, multiply the exponents together: $(x^y)^z = x^{y \times z}$

Any number raised to the power of zero is equal to one: $x^0 = 1$

So if you have the problem $x^3 \times x^2$, work out the answer like this:

$x^3 \times x^2 = x^{3+2} = x^5$

Or with a number in place of x:

$2^3 \times 2^2 = 2^5 = 32$

$m \div x^n = x^{m-n}$

So for the example problem $x^4 \div x^2$, find the solution as follows:

$x^4 \div x^2 = x^{4-2} = x^2$

And with a number in place of the x:

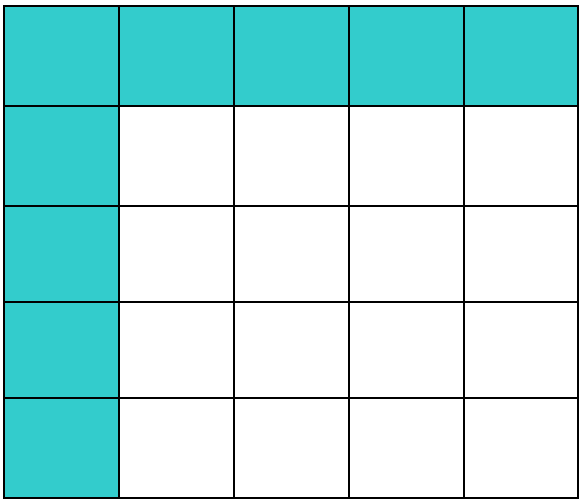
$5^4 \div 5^2 = 5^2 = 25$

SQUARED NUMBERS/ ROOTS

A Square root of a number is a value that, when multiplied by itself, gives the number. Example: 4 × 4 = 16, so a square root of 16 is 4. ... The symbol is √ which always means the positive square root.

*2^2= 2*2 = 4 (2 is the Square Root of 4)*
*5^2=(5*5)=25 (5 is the Square Root of 25)*
*10^2= 10*10=100 (10 is the Square Root of 100)....*
*17^2 = 17*17=289*
*35*30= 1225 (35 is the Square Root of 1225)*

*5*5 =25 – 5 is the (Square) Root and 25 is the Square*



Examples of Squares and Roots - Table to 100

Here are the square roots of all the perfect squares from 1 to 100.

$\sqrt{1} = 1$ since $1^2 = 1$
$\sqrt{4} = 2$ since $2^2 = 4$
$\sqrt{9} = 3$ since $3^2 = 9$
$\sqrt{16} = 4$ since $4^2 = 16$
$\sqrt{25} = 5$ since $5^2 = 25$
$\sqrt{36} = 6$ since $6^2 = 36$
$\sqrt{49} = 7$ since $7^2 = 49$
$\sqrt{64} = 8$ since $8^2 = 64$
$\sqrt{81} = 9$ since $9^2 = 81$
$\sqrt{100} = 10$ since $10^2 = 100$

Estimating is very important for all square roots that are not the square roots of perfect squares.

Estimate $\sqrt{10}$ by finding which two whole numbers it lies between

(math.com chart)

Estimate

Finding square roots of of numbers that aren't perfect squares without a calculator

1. Estimate - first, get as close as you can by finding two perfect square roots your number is between.
2. Divide - divide your number by one of those square roots.
3. Average - take the average of the result of step 2 and the root.
4. Use the result of step 3 to repeat steps 2 and 3 until you have a number that is accurate enough for you.

Example: Calculate the square root of 10 ($\sqrt{10}$) to 2 decimal places.

1. Find the two perfect square numbers it lies between.

Solution: $3^2 = 9$ and $4^2 = 16$, so $\sqrt{10}$ lies between 3 and 4.

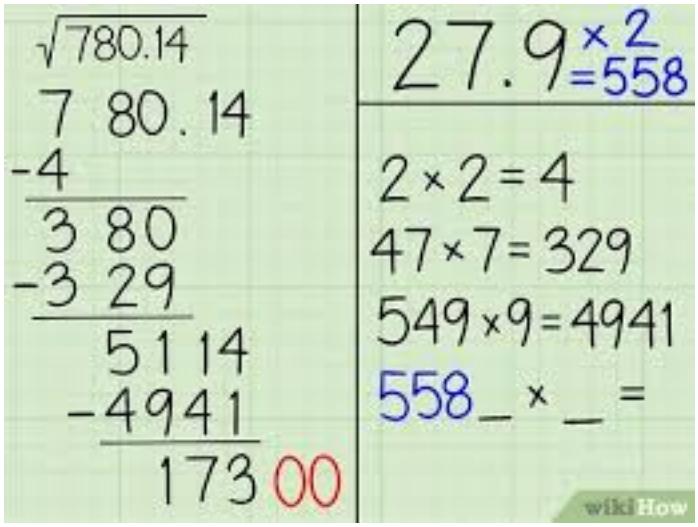
2. Divide 10 by 3. 10/3 = 3.33 (you can round off your answer)

3. Average 3.33 and 3. (3.33 + 3)/2 = 3.1667

Repeat step 2: 10/3.1667 = 3.1579
Repeat step 3: Average 3.1579 and 3.1667. (3.1579 + 3.1667)/2 = 3.1623
Try the answer --> Is 3.1623 squared equal to 10? 3.1623 x 3.1623 = 10.0001
If this is accurate enough for you, you can stop! Otherwise, you can repeat steps 2 and 3.

Note: There are a number of ways to calculate square roots without a calculator. This is only one of them.

How to Square:



You need to first separate the numbers into Categories by 2 from right to left 0 ex 14, 80 and 7

*The you look for a number which multiplied by itself is Lower that 7 (ex. 2 * **2=4 and 3** * 3=9 – so you have to pick 2 because 2*2 less than 7) – then you subtract 7*

*You bring down the next category (2 numbers) 38 – and you join with the 3 – to form number 380; You Double the first anwer 2 – so 2*2= 4 and you look for a number starting with 4_ *_ to be less than 380 (so 42*2=84; 43*3=129 ...all the way to 47*7=329 and 48*8 =*

384 – higher than 380) – so you have to choose 47; 7 is part of your answer set_ you subtract 380-329 =51

*Now you double your new answer on top (before 2) – now 27*2=54 and you look for 54_ *_ to be less than 5114 (you dropped the 14 to 51 and came up with a new number) – so a number attached to 54 _ multiplied by same number(anywhere between 1 and 9) to find a number less than 5114; closest is 549*9 = 4941; if you chose 548*8 =4384 – you will notice your still have more space to get closer to 5114)*

OPERATIONS WITH EXPONENTS

Calculate the Exponents

#	Exponent	Calculation	Answer
1	2^4 =	2*2*2*2=16	16
2	5^3 =		
3	7^4 =		
4	6^5 =		
5	25^3 =		
6	45^2 =		
7	35^1=		
8	27^6 =		
9	7^9 =		
10	10^5=		

SQUARE ROOTS (5^ 2= 5*5=25)

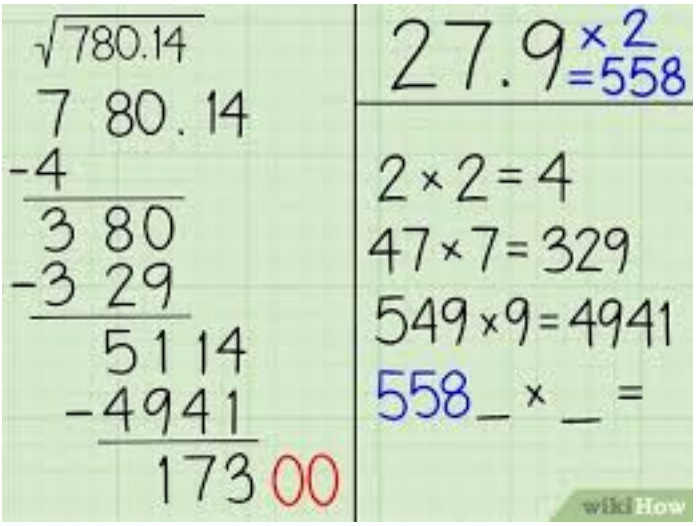
Square Roots are a Number multiplied by itself – or a number to the power of 2 – squared

#	Squared	Calculation	Square Answer
1	5^2=	5*5=25	25
2	7^2=		
3	9^2=		
4	11^2=		
5	15^2=		
6	20^2=		
7	27^2=		
8	35^2=		
9	68^2=		
10	75^2=		

ROOTS *(5^ 2= 5*5=25-)- √25=5*

(5^ 2= 5*5=25)- *Squared is 25; the Root is 25 is 5 √25=5*

BRIEF REVIEW ON HOW TO CALCULATE ROOTS:



ROOTS (5^ 2= 5*5=25-)- √25=5

CALCULATE THE ROOTS FOR THE GIVEN NUMBERS – SHOW YOUR WORK

√36	√81	√100	√225
√289	√400	√1225	√2401
√324	√1296	√2500	√3969

√121	√144	√196	√169
√484	√625	√1156	√5625
√2916	√3025	√5929	√8100
√102400	√14400	√55225	√220900

ORDER OF OPERATIONS

- EXPRESS AS PEDMAS – PARENTHESIS, EXPONENTS, DIVISION, MULTIPLICATION, ADDITION, SUBTRACTION
- ORDER OF OPERATIONS EXPLAINED
- ORDER OF OPERATIONS – SOLVE OPERATIONS/ CALCULATE

ORDER OF OPERATIONS

PEDMAS

P	PARENTHESIS	( )
E	EXPONENTS	X2
D	DIVISION	÷
M	MULTIPLICATION	*
A	ADDITION	+
S	SUBTRACTION	-

ORDER OF OPERATIONS - EXPLAINED

(https://en.wikipedia.org/wiki/Order_of_operations)

- In mathematics and computer programming, the **order of operations** (or **operator precedence**) is a collection of rules that reflect conventions about which procedures to perform first in order to evaluate a given mathematical expression.
- For example, in mathematics and most computer languages, multiplication is granted a higher precedence than addition, and it has been this way since the introduction of modern algebraic notation.[1][2] Thus, the expression 2 + 3 × 4 is interpreted to have the value 2 + (3 × 4) = 14, and not (2 + 3) × 4 = 20. With the introduction of exponents in the 16th and 17th centuries, they were given precedence over both addition and multiplication, and could be placed only as a superscript to the right of their base.[1]Thus $3 + 5^2 = 28$ and $3 \times 5^2 = 75$.
- These conventions exist to eliminate notational ambiguity, while allowing notation to be as brief as possible. Where it is desired to override the precedence conventions, or even simply to emphasize them, parentheses ( ) can be used to indicate an alternative order of operations (or to simply reinforce the default order of operations). For example, (2 + 3) × 4 = 20 forces addition to precede multiplication, while $(3 + 5)^2 = 64$ forces addition to precede exponentiation. If multiple pairs of parentheses are required in a mathematical expression (such as in the case of nested parentheses), the parentheses may be replaced by brackets or braces to avoid confusion, as in [2 × (3 + 4)] – 5 = 9.[3]

ORDER OF OPERATIONS – EXAMPLES

( ) – they stand for square brackets which I could not type

3+ (6 (11+1-4)) ÷ 8*2= We solved Brackets first

3+(6*8) ÷8*2= Then Brackets again - Multiplication

3+48÷ 8*2= Then the Division

3+ 6*2= Then the Multiplication

3+12= Then the Addition

15

(7+4) 3 = *11 *3=33* - Brackets First

7 + 4*3 = *7+ 12 = 19* – Multiplication first (as no brackets)

4^3 +2 -5 = *64 +2-5 =66-5 =61* – Exponents first, then additions and subtraction (used 4^3 – as 4 to the power of 3 – such a 4*4*4=16*4=64)

66÷3 * 2^2 = *66÷3 * 4 = 22*4=88*

ORDER OF OPERATIONS – CALCULATIONS

Solve the given Operations – use PEDMAS Rule to help you with the order of calculations;

#	Operation	Calculations
1	5+9*3 =	
2	(5-2)÷ 3 =	
3	(8+6)(20-5) =	
4	4^3 ÷4 =	
5	3^5 -40 +7=	
6	125 - 9*10=	
7	6^2 – (20÷4)=	
8	225÷5 + 7*5=	
9	16+4*5=	
10	88*5 -50	

GEOMETRY MIXED

- *Lines (segment, intersecting lines, parallel)*
- *Naming Angles, Types of Angles*
- *Lines (simple, segments, intersecting)*
- *Sum of Angles in a triangle is 180 degrees*
- *Plotting Coordinate Points*
- *Quadrilaterals (4 sides shapes)*
- *3 d Shapes*
- *Translations, Reflections, Rotations*
- *Pythagorean Theorem* ($C^2 = a^2 + b^2$)

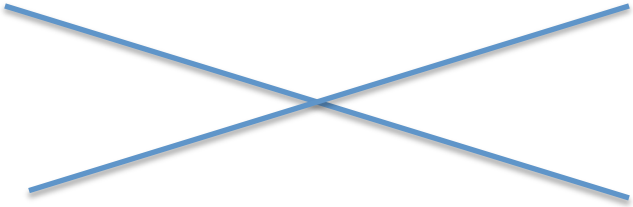
Types of Lines

Definitions:

- Line – a line that does not have any definitely endpoints
- Line Segment – a line with 2 end points
- Intersecting Lines – they meet each other at a common point (intersection)
- Parallel Lines – they never intersect

Line

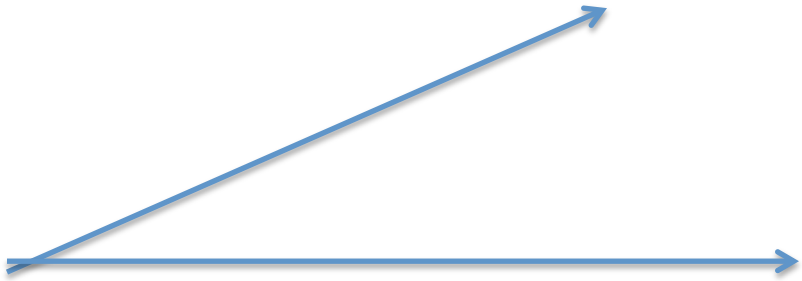
Intersecting Lines

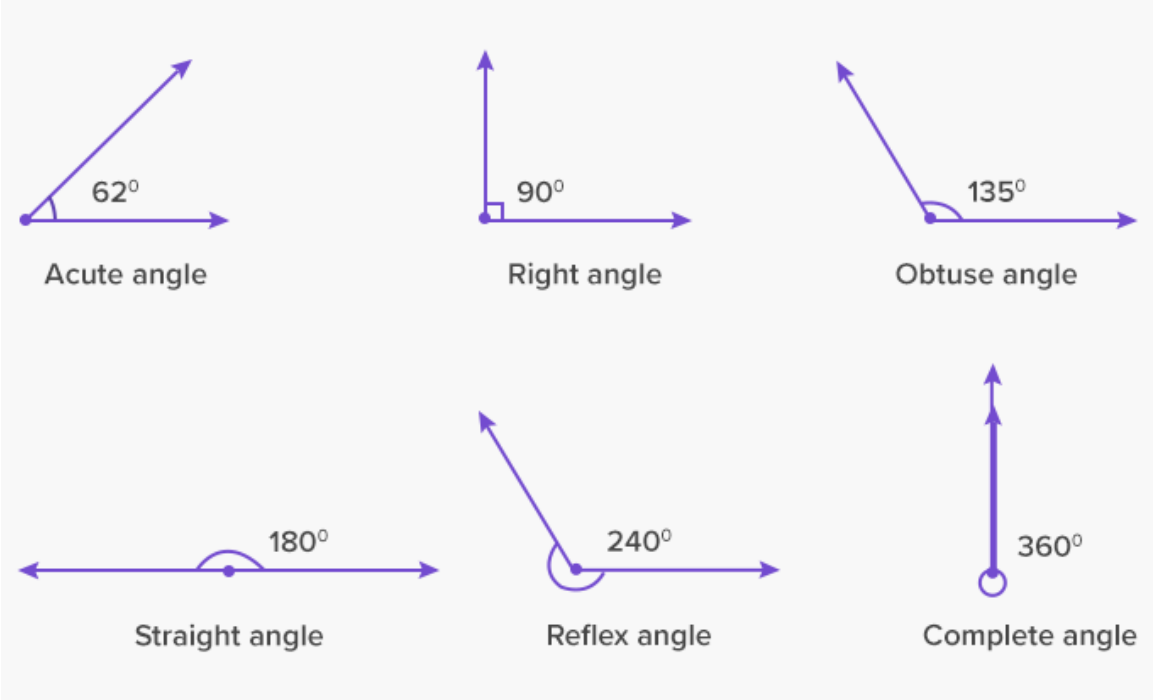


Parallel Lines

Types of Angles

In geometry, an Angle can be defined as the figure formed by two rays meeting at a common end point.
An angle is represented by the symbol ∠. Here, the angle below is ∠AOB.

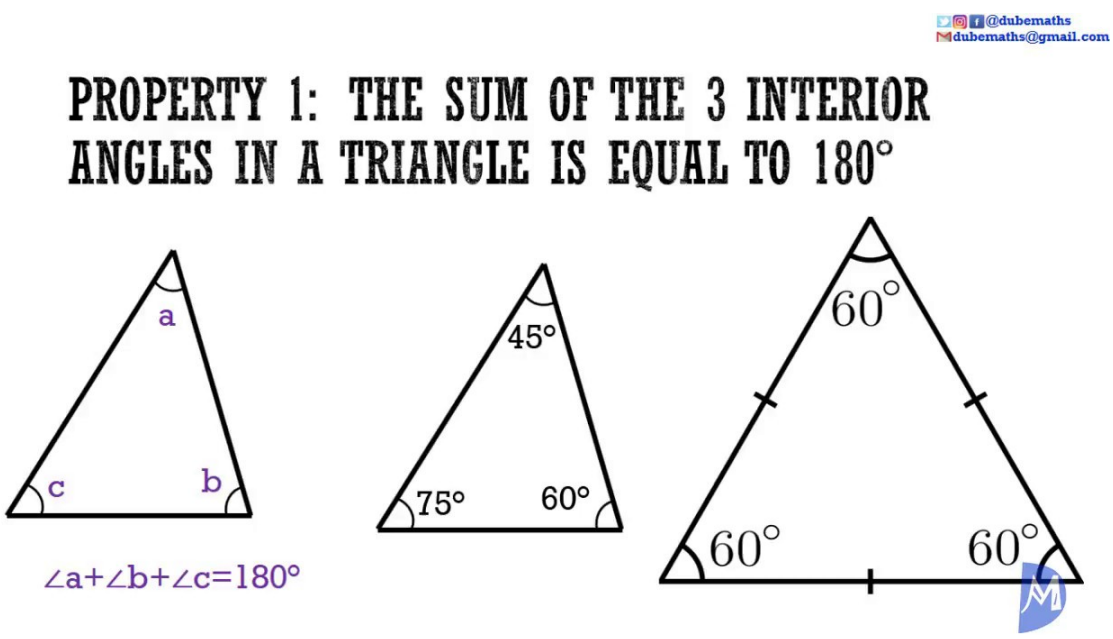




Types of Angles:

- Acute Angle – less than 90degrees angle
- Right Angle – 90 degrees angle
- Obtuse Angle – more than 90 degrees angle
- A straight Line – if you consider it an "angle" is a straight angle – or 180 degrees
- Reflex Angle – the remaining angle left from obtuse to the other side to complete a full rotation – 360 degrees – full rotation

Sum of Angles in Triangles:



Types of Angles

- Complementary Angles – two angles whose sum measures 90 degrees

- *Supplementary Angles - Two angles whose measures total 180 degrees.*

- *Adjacent Angles - When two angles share a side and a vertex but have no common interior points.*

- *Vertical Angles- When two lines intersect at a point, they form four angles. The nonadjacent angles are vertical angles.*

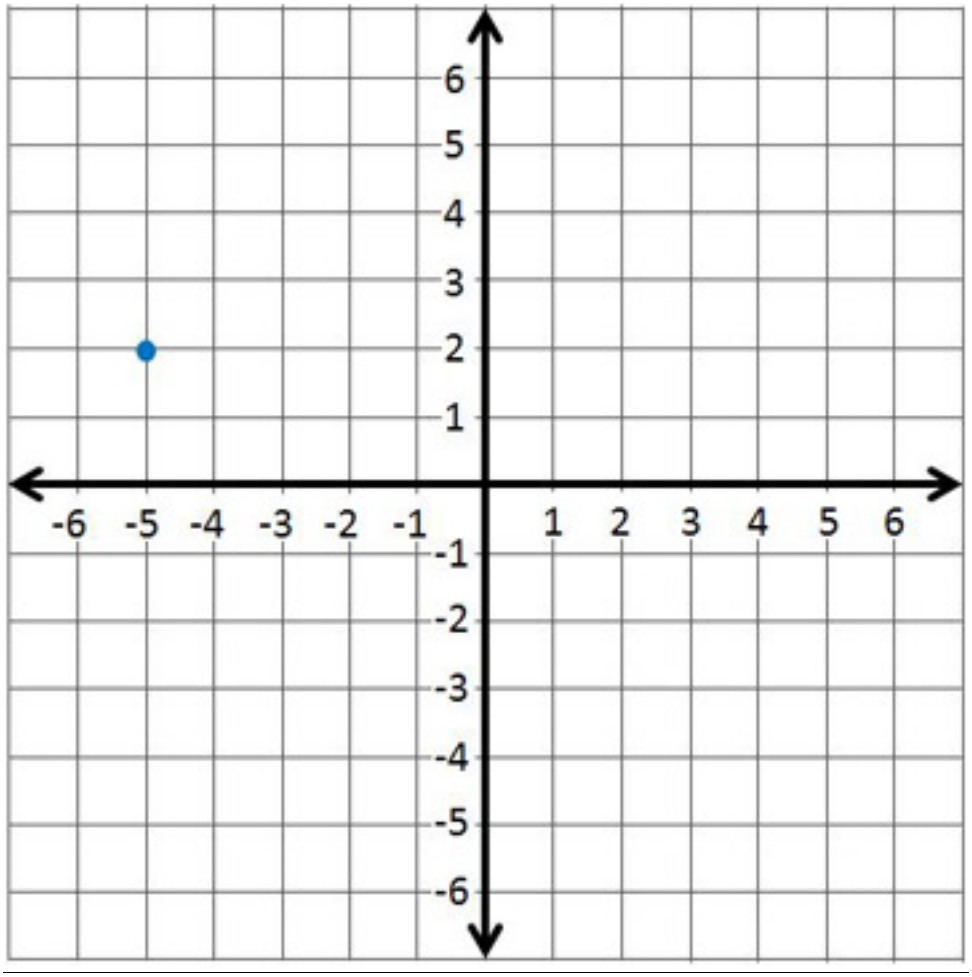
- *Alternate Interior Angles -The pairs of angles on opposite sides of the transversal for two lines, but inside the two lines.*

- *Alternate Exterior Angles - The pairs of angles on opposite sides of the transversal for two lines, but outside of the two lines.*

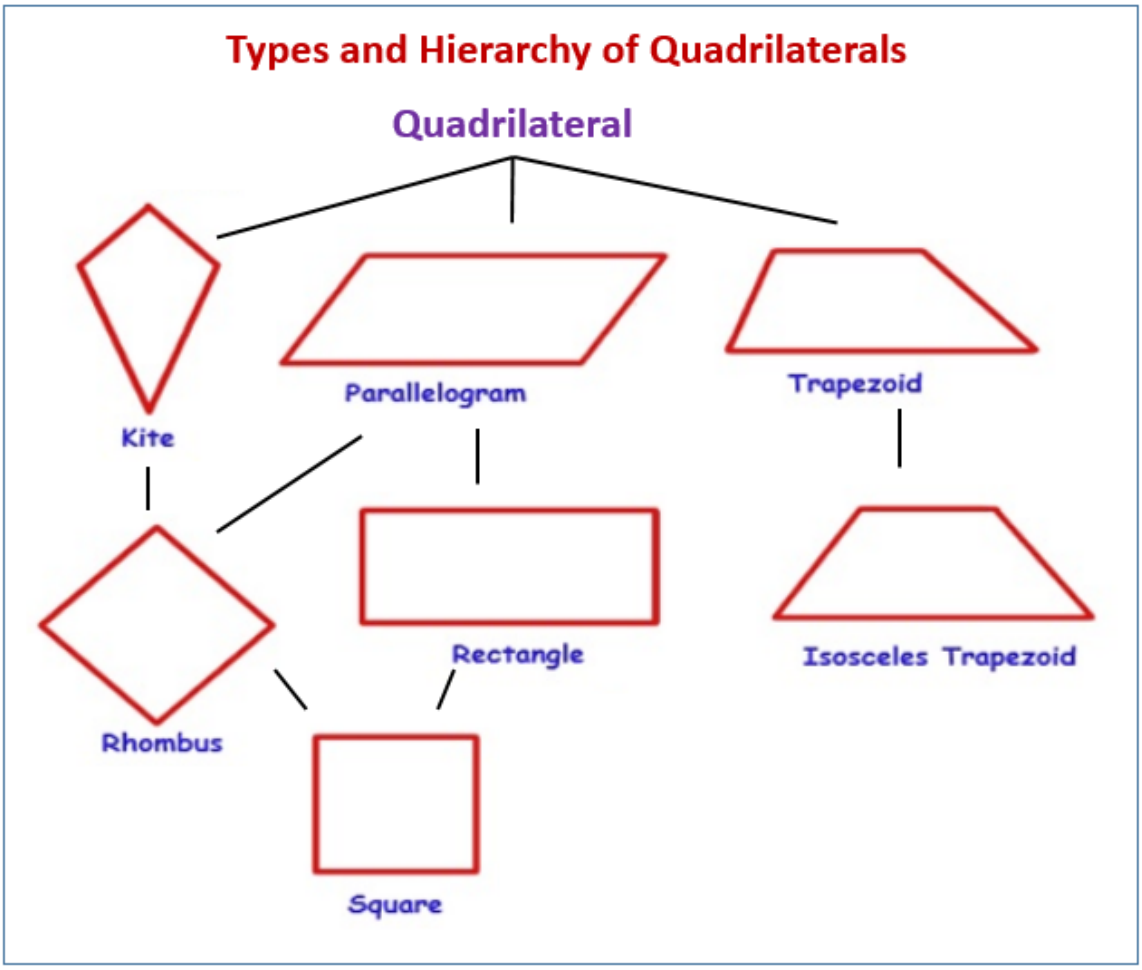
Coordinate Plane

- Horizontal Axis – *is called the X axis – values to the right of zero are positive values; values to the left of the zero are called negative values (numbers) – (plus 3 right, minus 3 left)*

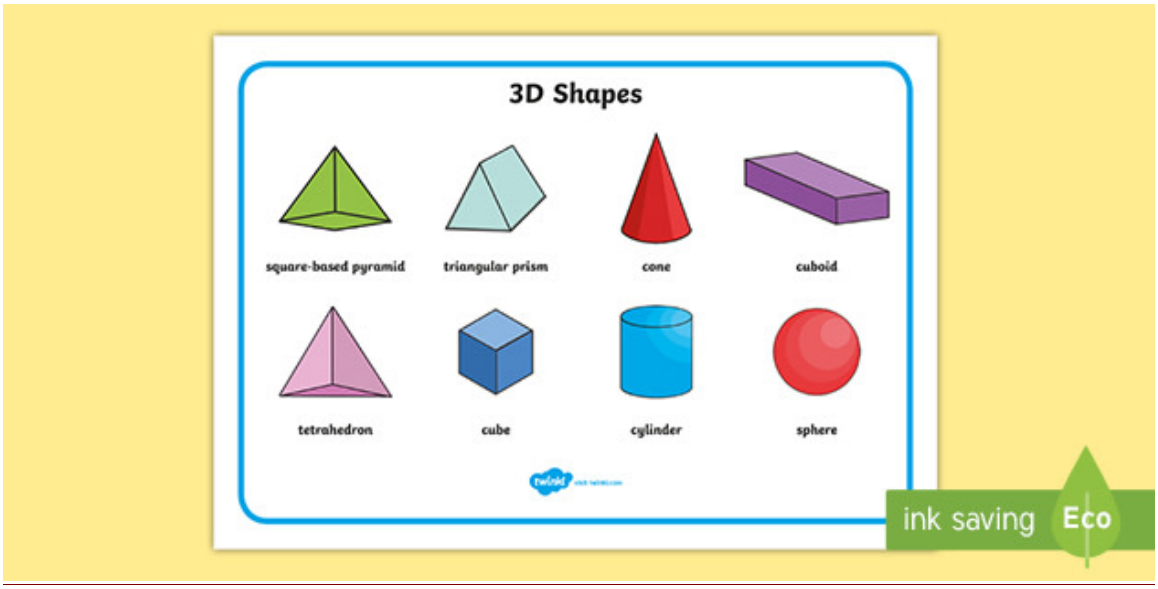
- *Vertical Axis – on top of Vertical it goes to positive values, and bottom of the vertical values goes to negative values (plus 5 top and negative 5 at the bottom)*



Quadrilaterals

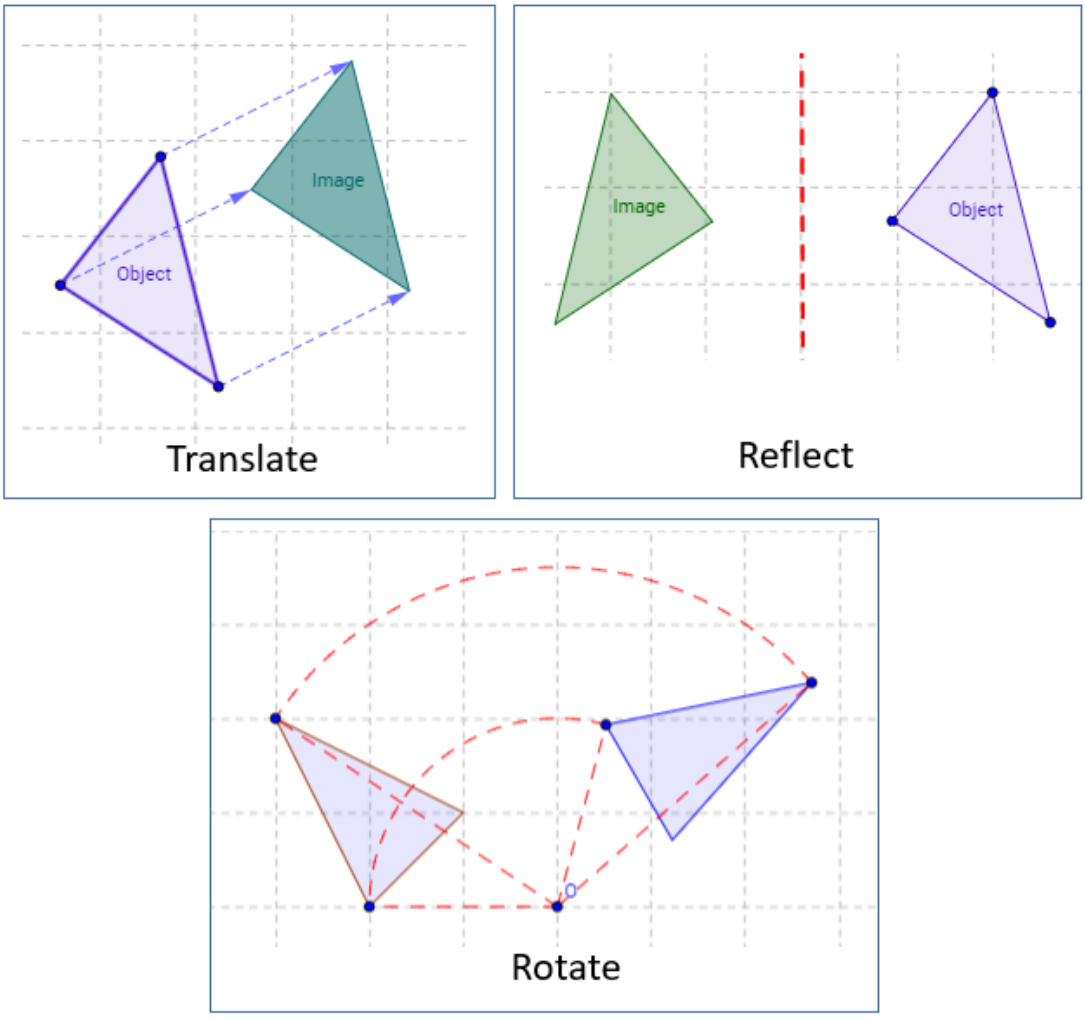


3D Shapes


3D Shapes
square-based pyramid
triangular prism
cone
cuboid
tetrahedron
cube
cylinder
sphere
ink saving
Eco

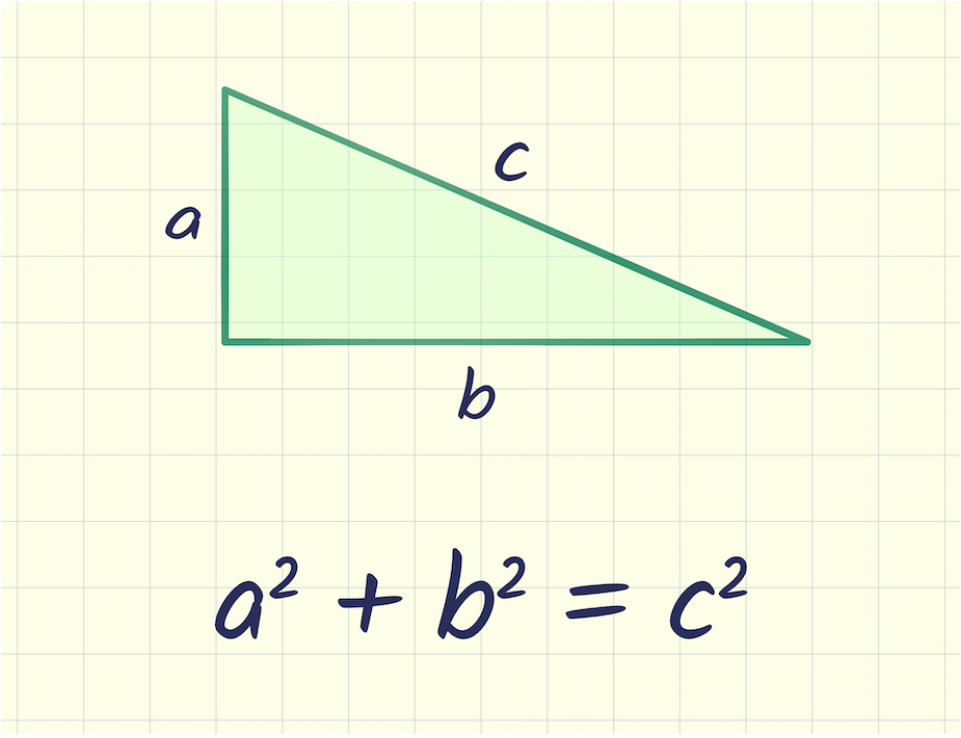
Translations, Reflections, Rotations

Transformations



- TRANSLATION is a SLIDE of an Object
- REFLECTION – is a FLIP of an Object
- ROTATION – is a TURN of an Object

Pythagoras' Theorem



It states that the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares on the other two sides. This theorem can be written as an equation relating the lengths of the sides a, b *and* c, *often called the "Pythagorean equation":*[1]

- A square +b square = C square
- A^2 +b^2=C^2
- $C^2 = a^2 + b^2$

INDEX

WHAT IS MULTIPLICATION

Multiplication is Repeated Addition

Examples:

- Number 4~ 3 times is 12 - 4+4+4 =12 or 4*3=12
- Number 1 – 1 times is 1 – or 1*1 is 1
- Number 5 – 6 times is 30 – or 5+5+5+5+5+5=30
- Number 9 ~ 3 times is 27 – or 9+9+9 =27 or 9 times 3 is 27
- Number 10 ~7 times is 70 – 10+10+10+10+10+10+10=70

4*3=12

*	*	*	*
*	*	*	*
*	*	*	*

1*1 =1

*

5*6=30

9*3=27

*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*
*	*	*	*	*

*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*

https://www.khanacademy.org/math/arithmetic-home/multiply-divide/mult-intro/v/basic-multiplication

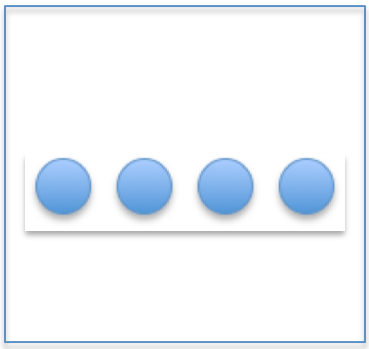
MUTIPLICATION CHART

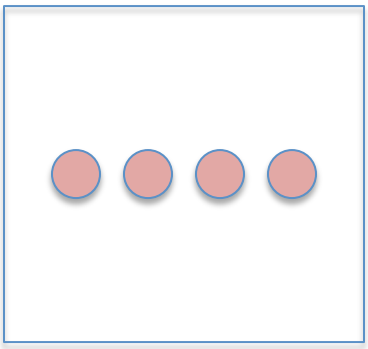
x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

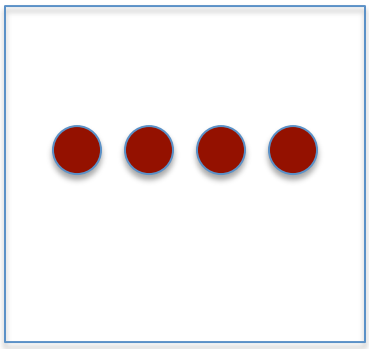
WHAT IS DIVISION

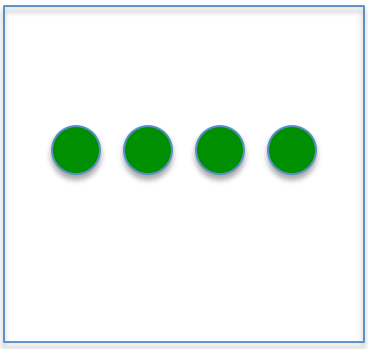
- The division is a method of distributing a group of things into equal parts; it is the opposite of multiplication
- Example if we have 16 circles, how do we share them equally in the given 4 boxes

https://www.khanacademy.org/math/arithmetic-home/multiply-divide/division-intro/v/division-1 - Introduction to Division Video









Divisibility rules

- Divisibility by 2, 5 and 10

A number is divisible by 2 if the final digit (the digit in the ones place) is even. Numbers ending in 0, 2, 4, 6, or 8 therefore are divisible by 2. A number is divisible by 5 if the final digit is a 0 or a 5. A number is divisible by 10 if the final digit is a 0.

- Divisibility by 3, 6 and 9

A number is divisible by 3 if the sum of its digits is divisible by 3. For example, 285 is divisible by 3 because 2 + 8 + 5 = 15 is divisible by 3. A number is divisible by 6 if it is divisible by both 3 and 2 (see above rules). A number is divisible by 9 if the sum of its digits is divisible by 9. For examples, 285 is not divisible by 9 because 2 + 8 + 5 = 15 is not divisible by 9.

- Divisibility by 4, 7 and 8

A number is divisible by 4 if the last two digits of the number are divisible by 4. For 7, there are a couple of strategies to use. A number is divisible by 8 if the last three digits are divisible by 8. This is the standard rule which can be a little sketchy for larger numbers, like who knows if 680 is divisible by 8? Because of this, we offer our Math-Drills.com solution which requires a little arithmetic, but can be accomplished quite easily with a little practice. As you know 8 is 2 to the third power, so we thought if you could divide the last three digits of a number by 2 three times, it would be divisible by 8. 680 ÷ 2 ÷ 2 ÷ 2 = 340 ÷ 2 ÷ 2 = 170 ÷ 2 = 85. We have a winner! 680 is indeed divisible by 8.

DIVISIBILITY RULES

https://www.thoughtco.com/divisibility-tricks-2312081

Dividing by 2

1. All even numbers are divisible by 2. E.g., all numbers ending in 0, 2, 4, 6, or 8.

Dividing by 3

1. Add up all the digits in the number.
2. Find out what the sum is. If the sum is divisible by 3, so is the number.
3. For example: 12123 (1+2+1+2+3=9) 9 is divisible by 3, therefore 12123 is too!

Dividing by 4

1. Are the last two digits in your number divisible by 4?
2. If so, the number is too!
3. For example: 358912 ends in 12 which is divisible by 4, and so is 358912.

Dividing by 5

1 Numbers ending in 5 or 0 are always divisible by 5.

Dividing by 6

1 If the number is divisible by 2 and 3, it is also divisible by 6.

Dividing by 7

First Test:

1. *Take the last digit in a number.*
2. *Double and subtract the last digit in your number from the rest of the digits.*
3. Repeat the process for larger numbers.
4. Example: Take 357. Double the 7 to get 14. Subtract 14 from 35 to get 21, which is divisible by 7, and we can now say that 357 is divisible by 7.

Second Test:

1. *Take the number and multiply each digit beginning on the right-hand side (ones) by 1, 3, 2, 6, 4, 5.* Repeat this sequence as necessary.
2. Add the products.
3. If the sum is divisible by 7, so is your number.
4. Example: Is 2016 divisible by 7?
5. 6(1) + 1(3) + 0(2) + 2(6) = 21
6. *21 is divisible by 7, and we can now say that 2016 is also divisible by 7.*

Dividing by 8

1. This one's not as easy. *If the last 3 digits are divisible by 8, so is the entire number.*
2. Example: 6008. The last 3 digits are divisible by 8, meaning 6008 is as well.

Dividing by 9

1. *Almost the same rule and dividing by 3. Add up all the digits in the number.*
2. Find out what the sum is. If the sum is divisible by 9, so is the number.
3. For example: 43785 (4+3+7+8+5=27) 27 is divisible by 9, therefore 43785 is too!

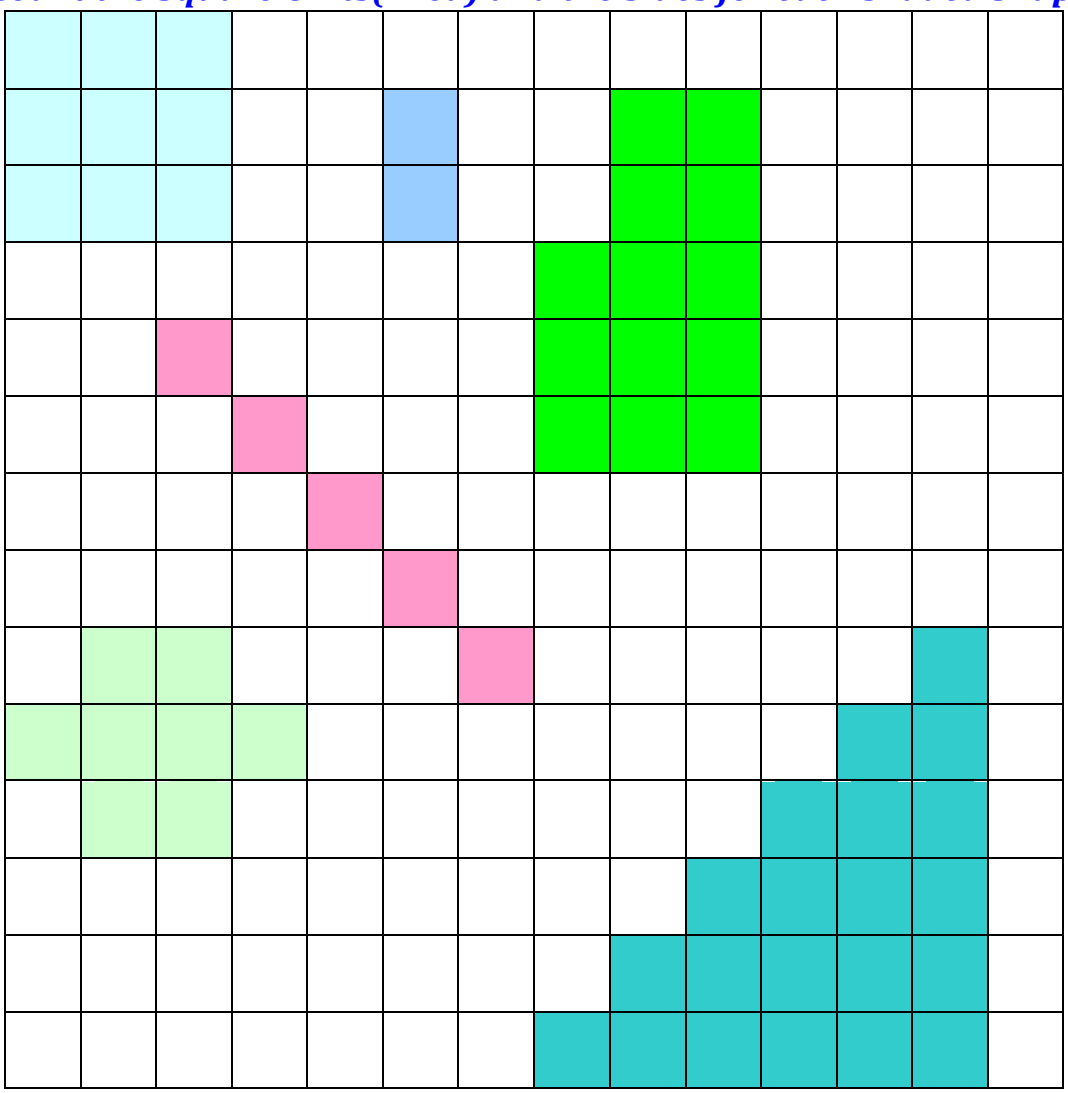
Dividing by 10

1. If the number ends in a 0, it is divisible by 10.

PERIMETER AND AREA – SQUARE UNITS

HOW MANY SQUARES DO THE SHAPES TAKE? (SQUARE UNITS)

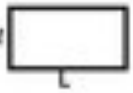
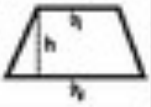
Count the Square Units(Area) and the Sides for each shaded Shape



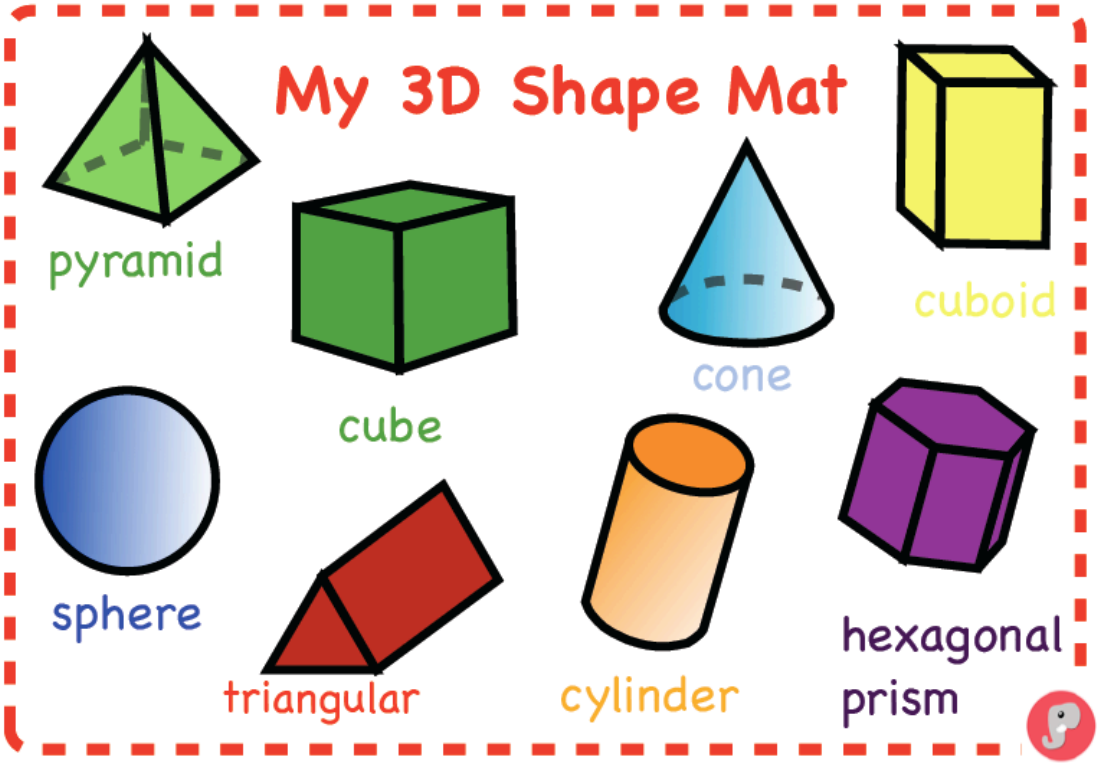
PERIMETER – ADDING UP THE SIDES

AREA – HOW MUCH SPACE IN A MEASURED UNIT SQUARE DOES THE SHAPRE TAKE (like cm, meter, etc)

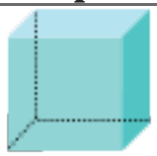
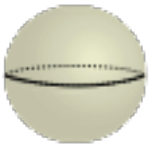
Area & Perimeter Formulas

Shape	Area	Perimeter
Circle 	$A = \pi r^2$	Circumference $C = \pi d = 2\pi r$
Parallelogram 	$A = b \times h$	$P = 2b + 2s$
Rectangle 	$A = L \times W$	$P = 2L + 2W$
Rhombus 	$A = \frac{(d)(d)}{2}$	$P = 4s$
Square 	$A = s^2$	$P = 4s$
Trapezoid 	$A = \frac{(b_1+b_2)h}{2}$	$P = b_1 + b_2 + s_1 + s_2$
Triangle 	$A = \frac{bh}{2}$	$P = s_1 + s_2 + s_3$

TYPES OF 3 D SHAPES



3 D SHAPES PROPERTIES

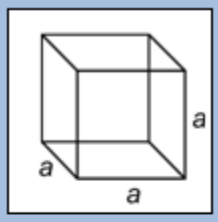
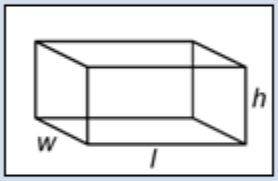
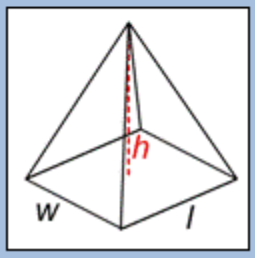
Name of 3D shape:	**Picture of 3D shape:**	**Attributes:**
Cube		Faces - 6 Edges - 12 Vertices - 8
Rectangular Prism or Cuboid		Faces - 6 Edges - 12 Vertices - 8
Sphere		Curved Face - 1 Edges - 0 Vertices - 0
Cone		Flat Face - 1 Curved Face - 1 Edges - 1 Vertices - 1
Cylinder		Flat Face - 2 Curved Face - 1 Edges - 2 Vertices - 0

VOLUME OF 3D SHAPES:

WE MUST CALCULATE THE AREA FIRST OF THE BASE – AND THEN MULTIPLY BY HEIGHT:

VOLUME OF 3D SHAPE – IS THE AREA HEIGHT*

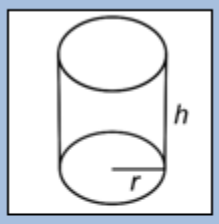
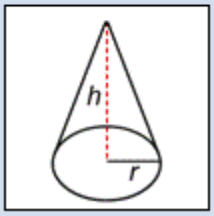
FOR PRISMS - Keep in mind that all cubes are actually rectangular prisms, so our formula for finding a cube's volume is the area of the cube's base times its height.

Name	Transparent Form	Volume Formula
Cube		$V = a \cdot a \cdot a = a^3$ a = the length of one side
Rectangular prism		$V = l \cdot w \cdot h$ l = length w = width h = height
Pyramid		$V = \frac{l \cdot w \cdot h}{3}$ l = length w = width h = height

For Rounded Shapes (area is a Circle)

A cylinder's volume is the area of the base (πr^2) times the height (h).

Let's compare the formula for the volume of cones ($V = \frac{\pi \cdot r^2 \cdot h}{3}$) with the formula for a pyramid's volume: ($V = \frac{l \cdot w \cdot h}{3}$). Well, we can see that the numerator of cone formulas is the same as the volume formula for cylinders and that the numerator of pyramid formulas is the same as the volume formula for rectangular prisms.

Name	Transparent Form	Volume Formula
Cylinder		$V = \pi \cdot r^2 \cdot h$ r = radius h = height
Cone		$V = \frac{\pi \cdot r^2 \cdot h}{3}$ r = radius h = height

Name	Wireframe Form	Volume Formula
Sphere		$V = \frac{4}{3}\pi r^3$ r = radius

WHAT IS PERCENT

A part or a Number out of Every 100 parts –
It is expressed as a percentage sign – like 7% or as a fraction 7/100

Example:

7 out of 100 – if you have 100 – then 7% is 7
if you have 200 – then 7 % - is 7 from first 100, then 7 from second hundred – that is 14

	7%	10%
100	7	10
200	7+7=14	10+10=20
300	7+7+7=21	10+10+10=30
400	28	40
500	35	50
600	42	60
700	49	70
800	56	80
900	63	90
1,000	70	100

Calculating Percent:

7% out of 200

– can be calculated as 7+7 =14

*or – as 7/100 *200 =14*

*or 7/100 ***200 =0.07***200 =14*

7 % out of 525 is better calculated as a fraction or decimal form as the number is not exact to be able to add it exactly:

*Example 7/100 out of 525 is 0.07*525 = 36.75*

*It can be approximated as 7*5 is 35 – but that would not be the exact figure;*

https://www.khanacademy.org/math/arithmetic-home/multiply-divide/mult-intro/v/basic-multiplication